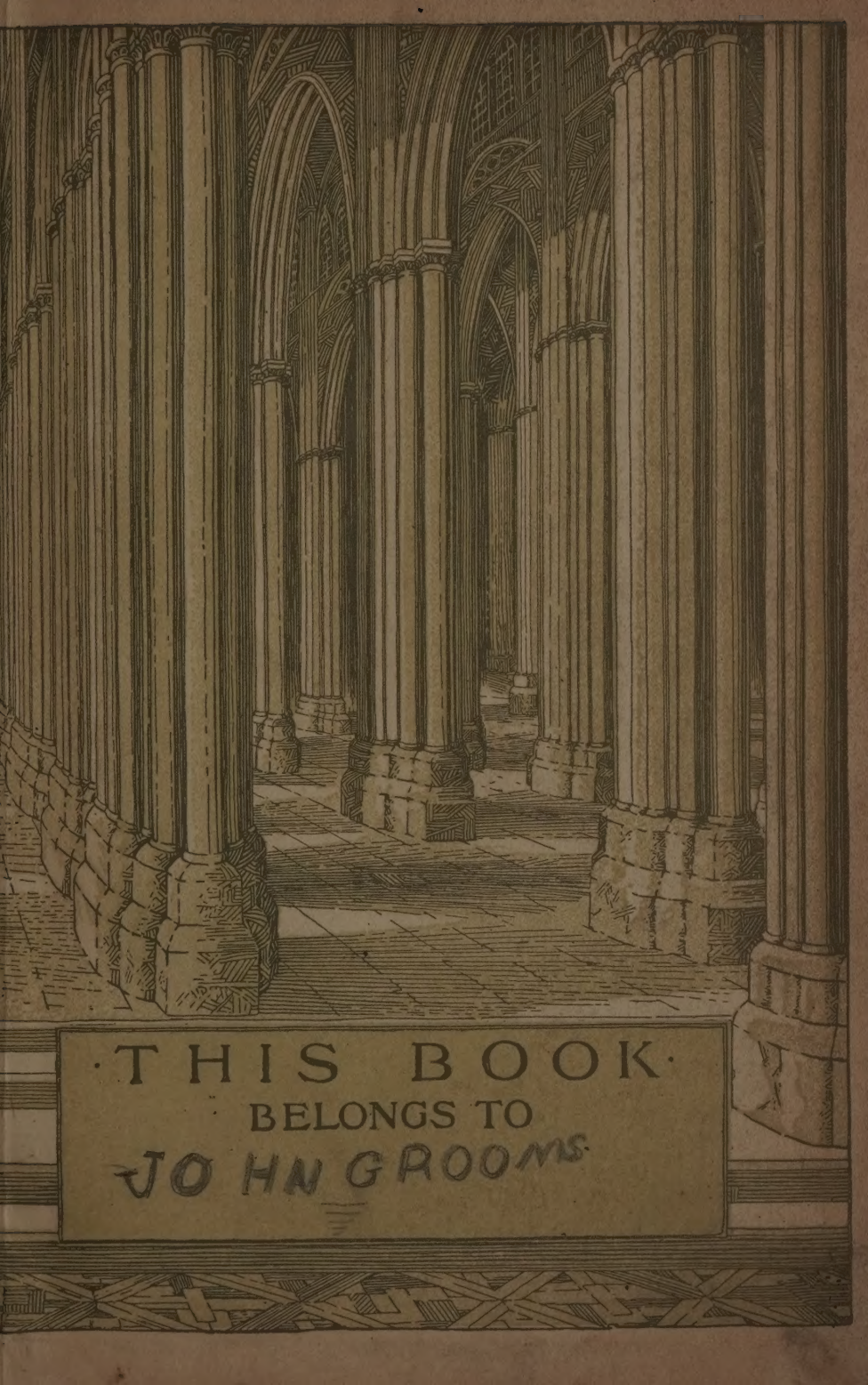
THIS BOOK
BELONGS TO
JOHN GROOMS

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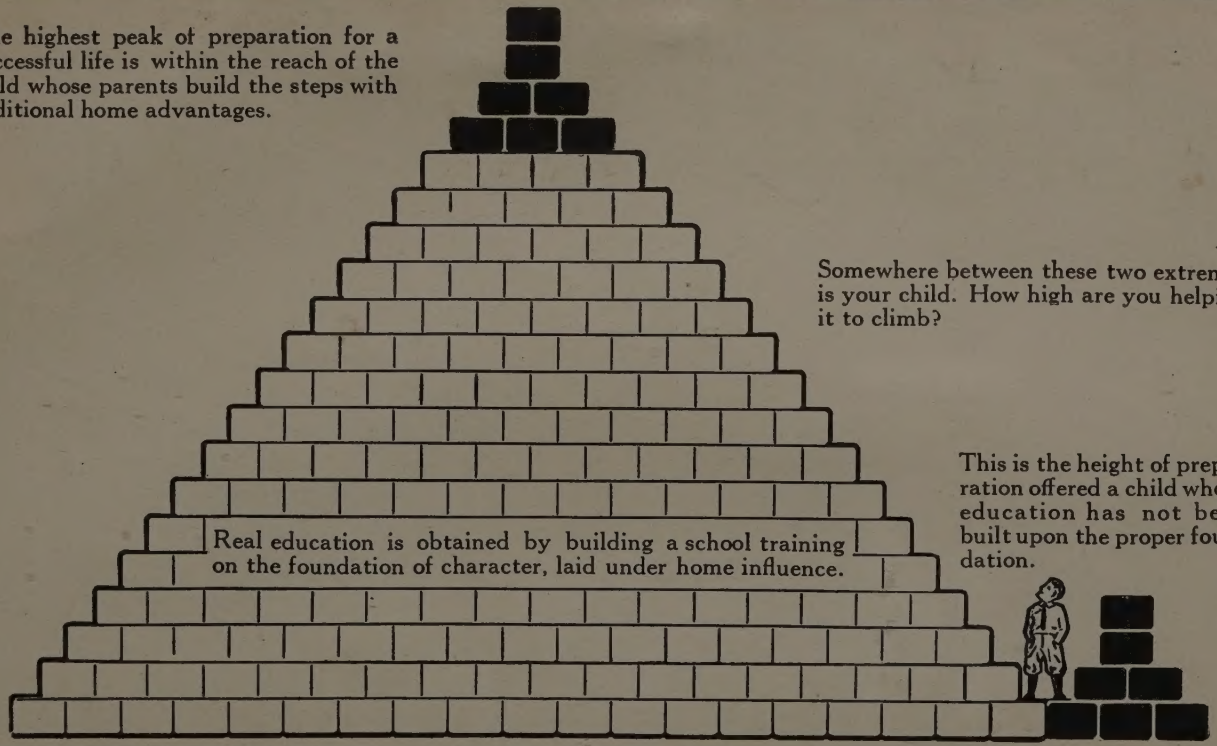
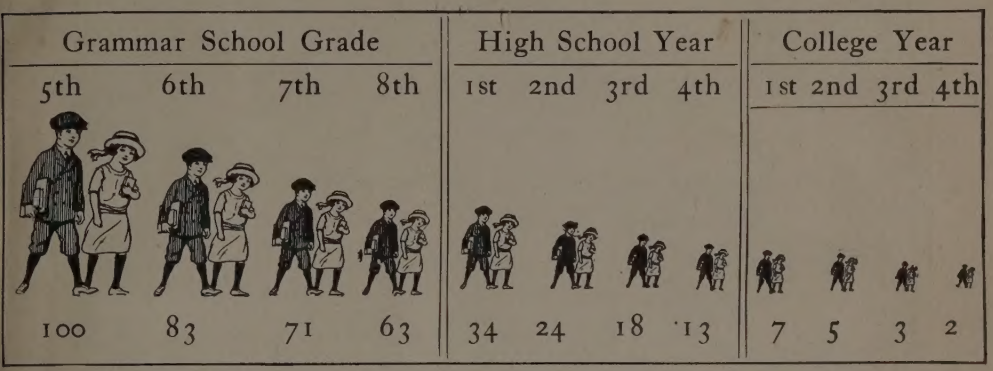
The highest peak of preparation for a successful life is within the reach of the child whose parents build the steps with additional home advantages.


Somewhere between these two extremes is your child. How high are you helping it to climb?
This is the height of preparation offered a child whose education has not been built upon the proper foundation.
Real education is obtained by building a school training on the foundation of character, laid under home influence.

The child spends twenty-six hours at home for every one hour in school, up to the age of twenty-one. This chart shows by the white squares the time spent under the home influence, compared to the time (black squares) spent in school.

YOUR CHILD'S CHANCE



HERE is the significant story of the children who enter the fifth grade of the Public Schools of the United States. Only 63 of each 100 graduate from grammar school—13 from high school—and 2 from college, according to Bulletin No. 34 of the U. S. Bureau of Education.

Another Bulletin shows that in the biographical book known as "Who's Who in America," which lists more than 20,000 successful living Americans, there are 87 times as many high school graduates and 800 times as many college graduates as there are those who have had only grammar school teaching.

THE "STUDENT'S" AS AN INVESTMENT

The "STUDENT'S" costs the mother of a child of:	Cost Per Day	Cost Per Year	Number Years School Use
Three Years	Less than 1 cent	$ 2.65	15
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THE DAYS I WOULD LIKE TO LIVE OVER

By Dr. Frank Crane

THERE is no time of my life I would rather live over than my school days.

It may interest boys and girls to know how I, fifty years old and over, having had all sorts of experience, would feel about going to school, if I were young again.

I would surely go to school, because school is the best place in which to pass one's youth. No matter how great a chance to make money a boy may have, he will make more money in the long run if he has a good schooling. No matter how good an opportunity a girl may have to get married, she will make a better wife and mother, and be happier, if she has an education.

There is more and better fun to be had in school than anywhere else during the age between six and twenty-one.

You are much more likely to meet the best kind of people with whom to form lifelong friendships in school than elsewhere.

Schools are not perfect, but they are the best institutions that exist for boys and girls. They are the finest product of civilization, the best result of evolution.

Time spent in school is not wasted. You lose nothing by taking pains to sharpen your ax.

In school you get in touch with the past. The human race has existed a long while. At school you get the benefit of its accumulated experience. You stand on your forefathers' shoulders and do not have to try experiments they have tried over and over.

At school you acquire your inheritance from the wisdom of the past, which is better than inheriting a million dollars from your father.

At school you learn to love and to use books, and from books have come the best efficiency and enjoyment of my life.

At school you learn what is best of all, how to form good tastes. The most marked difference between a cultured person and a vulgar one is the kind of things they like.

At school you learn how to use your riches so as to get real satisfaction, if you are to be rich; also, if your are to be poor, how to have a full and happy life in spite of it.

At school you rub off the sharp corners of your personality; you learn how to be agreeable, how to get along with folks, and how to play the game of life with the most enjoyment.

Of all the men and women I have known, not one of them was ever sorry for going to school, and every one who for any reason has missed an education regretted it.

If you have parents that will send you to school you are fortunate, and thrice fortunate if you have to work your way through school by your own exertions.

To say that you would like to go to school if you were able is nonsense. Any boy can get an education if he desires it enough. Any girl can get schooling if she is sufficiently determined.

Of all the fools that roam the earth, the one that wears the blue ribbon as the biggest fool of all is the boy who will not go to school because he wants to go into business. His only competitor for first prize is the girl who leaves school to get married.

By permission of Dr. Frank Crane and the Publishers of Good Housekeeping Magazine.

T IS to be feared that a great many people are substituting the public library for the private library. This is a mistake. The best books are meant to be lived with, not to be "called upon" in hours of leisure. They ought to be with us under our roofs, not in a public building at a distance. We ought to be on intimate terms with them. They ought always to be at our hand, and they cannot be at our hands unless they take up their abiding place under our roofs.

¶ A home library need not be very extensive, but it ought to be well selected and it ought to be part of the furnishings of every home.

¶ Every home ought to steadily grow. No one has any right to allow children to grow up in a bookless home. There can be no finer educational opportunity for a child than to grow up with good books close at hand, and this opportunity, which costs very little, ought never to be denied.

¶ The purchase of books should be planned by people of meager income with as much forethought as the purchase of furniture, for the library in the home is not a luxury, but a necessity without which it is impossible to put the home on the right basis.

HAMILTON WRIGHT MABIE

Library Talks.
Ladies' Home Journal.

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THE NEW

STUDENT'S REFERENCE WORK

FOR

TEACHERS, STUDENTS AND FAMILIES

EDITED BY
CHANDLER B. BEACH, A.M., LL.D

ASSOCIATE EDITOR
FRANK MORTON McMURRY, PH.D

VOLUME I

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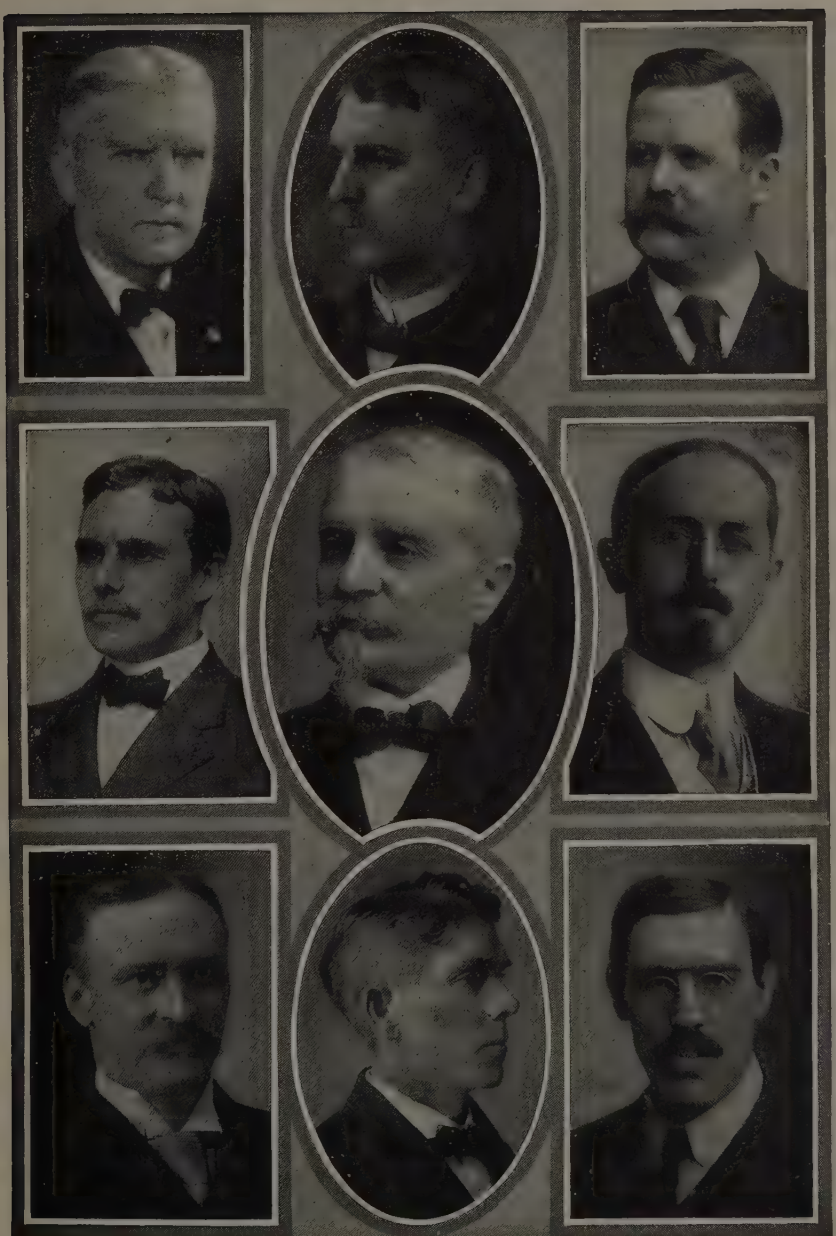

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OPTIMISM

By Dr. Frank Crane

ABOUT the most winning thing in any boy or girl is the spirit of optimism.

That means, looking on the bright side of things.

There are always two sides to everything, and whether we see the dark or the light is very largely a matter of habit.

We all want to be liked, we want to be welcome, we want to be appreciated. And there is nothing in this whole world that is more likable and welcome and appreciated than cheer.

If you do not feel very well, conceal it as much as possible. That is not hypocrisy, it is simply consideration for other people's feelings.

If you are afraid, keep your fears to yourself. If you are in sorrow and trouble, do not talk about it.

Remember that other people have their own fears, troubles and sorrows, and it is a burden to them to have to bear yours also.

Nobody wants gloom. Everybody wants brightness.

If you are a girl, you naturally want to be loved, and a good thing for you to know is that it is not always the beautiful girls that are the best loved. It is the happy girls, those whose spirits are bright, whose words are cheery and whose enthusiasm is always present.

Nobody can help liking such persons.

Optimism is a word that comes from a Latin word meaning "the best." It implies thinking the best, looking for the best, and believing in the best.

And why not? None of us knows what is going to happen. Good luck may come, or bad luck. Tomorrow may be a happy day, or some trouble may appear. And as long as no one knows, why not believe that the best will come?

If you do believe this, it will make you strong and courageous and better prepared to meet whatever fortune the morrow may bring. While if you believe in some gloomy outcome, it will make you weak and nervous and unprepared.

We must remember that optimism is not a question that can be argued by facts. That is, no one can prove that things are going to turn out well, nor that they are going to turn out badly. Optimism is merely a state of mind. It is a point of view. It is a temper of the spirit.

And if we take this constant attitude of hope, and bright courage, it is going to make the world a better place to live in, and it is going to make us a better kind of people to live in it.

Optimism is a duty. The Bible says, "Rejoice, and again I say unto you, rejoice."

It is not only a duty, it is a privilege and an advantage. It makes life easier for us, and in every way we are better qualified to get along with people and succeed in our business than those whose outlook is always gloomy.

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DEER TAKEN BY FLASHLIGHT

material should be selected with a view to the continual exercise and development of the perceptive activities, of observation, of understanding, of memory, of judgment and of language. But the primary purpose should be a development of a genuine love of nature. This should be a very prominent idea in selection throughout the elementary school, at least, and probably higher.

There is abundant material in every locality for use in this study. The teacher's individuality and ingenuity will enable him to utilize the children in gathering the material and the data for talks and studies. In the higher grades the inquiries should be exhaustive and should assume a more strictly scientific form.

In September or October there are many interesting and instructive features of plant life which furnish the material in sufficient variety for several lessons: the more common autumn fruits of the locality, wild and cultivated, with a study of their form, texture, flavor, name and use; the autumn leaves and flowers with a study of their form, color etc.; the autumn seeds, their forms, methods of distribution by winds, by animals, by water. The animal life of these months is full of interest for young and old. The birds which have summered in the locality are going south and others with strange plumage are coming from the north on their way further south or to spend the winter here. Insects are gradually disappearing in a variety of ways, some going into winter quarters to appear in new forms in the spring, others hiding away in the trees, in the earth or elsewhere, while countless multitudes deposit their eggs and die. The thickening of the coats of the wild and domestic animals should be carefully observed now and in the month following. Clouds, rain, dew, frost, changes in temperature, direction of the wind will interest the child every month in the year.

In November and December nature study finds ample outdoor range in discovering how the plants have prepared for winter, how the buds are sealed up, where the leaves have gone, what animals still remain in the locality and how they live, what the streams are doing, where the fish and other water animals have gone, what the farmers are doing. They also are good months for studying further the collections of fruits, seeds, leaves, grasses made in other months. Why are the days so short now? Why is the sun so far south? Why are fruits and vegetables beginning to rise in price in the markets?

The weather is a fruitful theme during January, February and March, but there is much also to engage attention in the lines mentioned for the preceding months. A simple study of the forms and modes of movement of domestic and of wild animals will make a few attractive lessons. These are good months for the study of the various forms of water and for making simple experiments in light, heat, electricity. Note later the signs of springtime in the growing length of the days, in the disappearance of frost and snow, in the swelling and opening of certain kinds of buds, in the flowing of the sap in the trees, in the appearance of an occasional last year's animal, in the song of the robin or the quick cry of the redbird, in the buzzing of venturesome bees, in the work about house and farm.

April, May and June conspire to furnish a world of material to attract and interest childhood. The studies should include the germination of seeds, the unfolding of leaves, the opening of the flowers; the parts of the plant, of the leaves and of the flowers; the various animals that cover the earth and skim the air; the moulting of the birds; the metamorphosis of the grasshopper, the butterfly, the frog; the building of nests; the swarming of the bees; animal foods. They should also include all kinds of work about farm and home and keep the child in close touch with ploughing time and seed time and harvest; with the pests the farmer fears; and with the friends he should protect.

July and August, as well as a great part of June, are months in which the child is usually out of school, but if the teaching during the other months is successful, these months also will have much in experiences upon which he will find pleasure in drawing as school opens in September.

Nature study includes the various parts and functions of the child's body, as well as of animals in general, and should make the child acquainted with the conditions essential to good health and to the development of physical strength and skill. It also includes a study of the topography of the locality, the soil, the rocks, the mineral deposits, the springs and streams, together with the forces which have shaped and are shaping the land. Excursions to other localities will be invaluable in adding zest to every phase of the study.

Success in directing nature study depends greatly upon the teacher's ability to select and arrange these materials in such a way as to bring them within the growing capacity of the child and yet stimulate perpetual effort. All of the foregoing and much more may readily be covered in a simple way in the first three years of a child's school life. The enlargement of the scope of the study in the following years gradually differentiates into geography, botany, physiology, physics, chemistry, meteorology, astronomy, zoology and geology.

Two kinds of work in this field are very desirable: extensive work and intensive work. In the first place, it is desirable that at least one period per week in the ele-

mentary school be occupied with brief consideration of the many nature-study objects the children in a class collect here and there and bring to school. A few interesting remarks by the teacher about each of a dozen or more objects on such an occasion can do much to keep children alive to the things about them. In the second place, it is desirable that important topics, as the horse, cow, cat, song-bird or maple-tree, be treated at length. Often in a third or fourth year class one month of these periods per week may be too little time for one such topic. The former is extensive, while the latter is intensive study.

As to method: Mere description or observation should be subordinated to function as a rule. It usually is uninteresting to begin the study of a plant or animal with mere observation or description, and it is unnecessary. It is far better to start off for the solution of some important problem, and in general to study under the influence of problems. For example, if the squirrel is the subject, a class can set out to study how he manages to live through the winter, how he gets food in the summer. The answers to such questions will require much close observation or description, and at the same time preserve more organization among the multitude of facts collected.

A few of the many good books dealing with the facts of nature are the following: *Madam How and Lady Why* by Charles Kingsley; *Sharp Eyes* by Wm. H. Gibson; *Wild Animals I Have Known* by Ernest Seton Thompson; *The First Book of Birds* by Olive Thorne Miller; *Neighbors with Wings and Fins* by James Johonnat; and *Birds and Bees* by John Burroughs. A few of the best helps to teachers are *Nature Study and Life* by C. F. Hodge (the best); *Nature Study* by W. S. Jackman; *Special Method in Elementary Science* and *Nature Study Lessons*, both by McMurry.

Nature-Study with the Camera. Since the perfection of modern photographic apparatus, — the hand-camera with its quick shutters, rapid dry-plates and films, — the hunting of wild life with a camera has become a fascinating recreation. Even in sporting circles there is a call to substitute the camera for the gun as the sportsman's weapon. *Forest and Stream*, arguing for such a change, says: "Every camera hunter must admit that more immediate and lasting pleasure is afforded in raking a running deer from stem to stern at twenty yards with his 5 x 7 bore camera than in driving an ounce ball through its heart at 100 yards. Then think of the unlimited freedom of this noiseless weapon. No closed season, no restriction in numbers or methods of transportation, no posted land; but you can pull on a swimming deer or an elk floundering in the snow, take a crack at a spotted fawn, bag the bird on its nest or string your cameras out like traps, with a thread across the runway, and gather in the exposed, game-laden plates at nightfall without any scruples about being called a pot-hunter or a game-hog." In introducing a book of wild life illustrated with the camera President Roosevelt wrote: "The older I grow, the less I care to shoot anything but 'varmints.' If we can only get the camera in place of the gun and have the sportsman sunk somewhat in the naturalist and the lover of wild things, the next generation will see an immense change for the better in the life of our woods and waters."

But this use of the camera has proved of distinct value in aid of nature-study, providing the means of gaining a clear and intimate knowledge of wild animals, birds and reptiles, their appearance, their haunts, their habits and all the phases and conditions of their life. Moreover, the young are thus enabled to become direct observers and students of animated nature; for not only have naturalists, as Chapman, and camera-hunters, as Dugmore and Wallihan, brought from the Rockies, from the forests and waters of Canada and from the shores and everglades of Florida the trophies of their skill and patience in a wealth of photographic pictures of every variety of wild animal, running, climbing or feeding, and of birds and wild fowl in flight or at rest, but amateurs, even schoolboys and girls have become expert in securing photographs of the more familiar birds and animals to be found in field and forest accessible to every village and town. With the development of habits of close observation, quick perception and careful analysis required in this delightful pursuit, the love of nature is begotten, and the career of a naturalist is often determined then and there. Teachers who lead their classes to field and wood will find the camera a most interesting and helpful adjunct to these excursions. Stalking a bird, a rabbit, a squirrel or a gopher, while simple and tame to the expert, is to the school boy an experience full of interest. Soon he will come to note in what surroundings the bird or animal is found, what it is doing, if feeding what sort of food it is eating, the place and character of its nest or burrow. The pictures when developed recall these details and fix them in the mind, and the boy thus becomes possessed of a fund of valuable information obtained at first hand. With increased experience these excursions may take wider range. The mature lad will give zest to his vacations by becoming a hunter of wild life with camera and flashlight.

The pictures which follow give suggestions of the thrilling experiences and show the splendid rewards which come to the man who hunts with a camera.

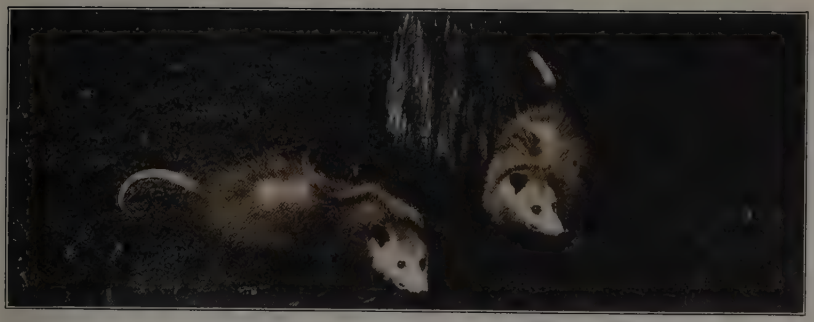
SALMON JUMPING FALLS—Photographed by Dr. R. T. Morris

CARIBOU SWIMMING.—Photographed from Canoe Distant Fifteen Feet

OTTER

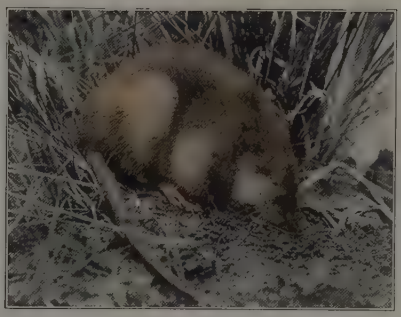
Courtesy of Doubleday, Page & Co.

PORCUPINE



OPOSSUM

PRAIRIE DOG

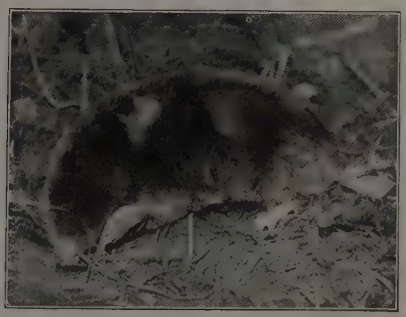


MUSKRAT

GOPHER

WEASEL

WOODCHUCK OR GROUND HOG



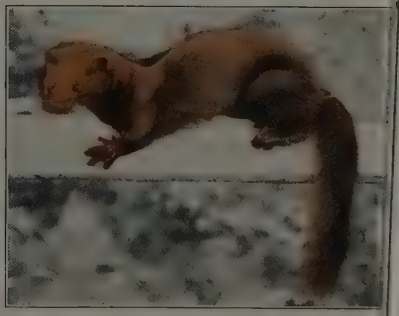
MOLE

SKUNK CROSSING A STREAM

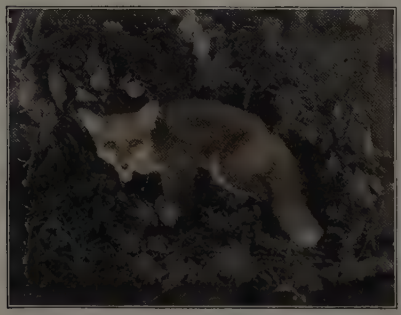
CHIPMUNK

RACCOON

SQUIRREL



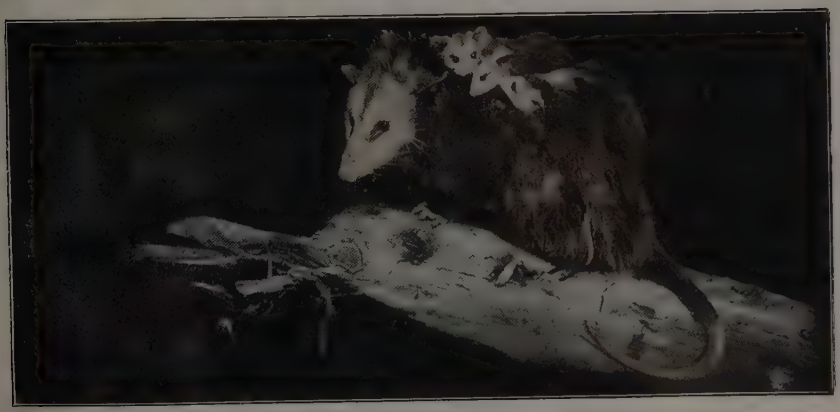
MINK



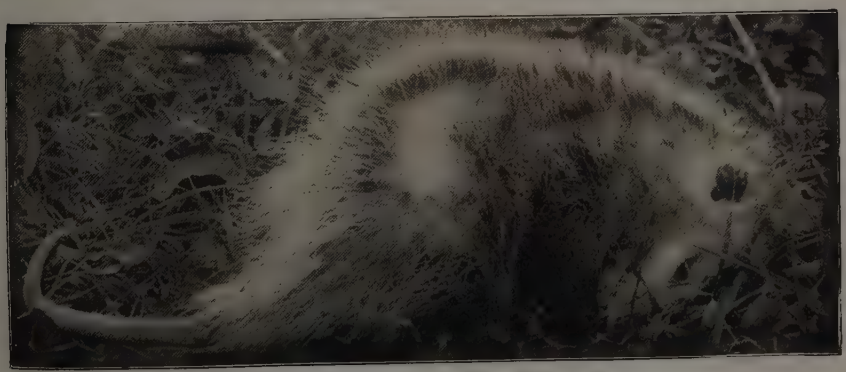
RED FOX

COYOTE

OPOSSUM, SHOWING YOUNG AT THE MOUTH OF THE POUCH



OPOSSUM, SHOWING YOUNG ON THE MOTHER'S BACK



"PLAYING 'POSSUM." THIS ANIMAL IS ALIVE

Courtesy of Doubleday, Page & Co.

SPIDER WATCHING FOR PREY

WHITE-FOOTED MOUSE AND YOUNG—By A. R. Dugmore

MR. DUGMORE RAN A MILE TO RESTORE THE MOTHER TO HER CHILDREN, SHE HAVING RUN INTO HIS POCKET WHI
FRIGHTENED, AND BEING FOUND THERE LATER

Courtesy of Doubleday, Page & Co.

and seems to destroy also the moral faculties. For the opium wars see CHINA. See *Opium and the Opium Appetite* by Calkin and *Opium Smoking in America and China.*

Oporto (*ō-pôr'tō̇*), the second city in Portugal, is situated on the Douro, three miles from the Atlantic. The city climbs the steep banks of the river, its houses, gayly painted, making a bright picture set off from the pine-covered mountains behind it. On one of the crags overlooking the river is a crystal palace surrounded with gardens. The old cathedral was built by Henry the Navigator; the Gothic church was founded in 559; and the former monasteries are used, one as a citadel, one as an exchange and one as barracks. There are a medical school (246 students), observatory, a fine art academy (133 students), library of 250,000 volumes and two picture galleries. The railroad to Lisbon crosses the river a little above the city on one of the finest arch bridges built. The manufactures are cloth, silk, hats, porcelain, ribbons, tobacco, soap and metal casting, distilling, cork-cutting and sugar-refining. It is the chief seat of the export trade in port wine, and in the vicinity, in 1900, were 15 cottonmills. Oporto was the stronghold of the Christians in the peninsula against the attacks of the Moors. The people in 1828 opposed the usurper, Miguel, who executed many of them; but they supported Pedro of Brazil, and withstood the besiegers thirteen months. Population 167,955.

Opos'sum, animal representing the marsupials or pouched animals in the New World.

OPOSSUM

There are some 16 species, varying in size from a cat down to a mouse. Some are provided with pouches on the under side of the body in which the young are reared, and others have no sign of a pouch. In those forms without a pouch the young, when fully developed, are frequently carried on the back, with their tails twined round that of the mother. The Virginia opossum is common from the central United States to Brazil. It is one of the largest members of the group, being about the size of a cat. The hair is long and coarse; black and white, giving the appearance of grayish-white, underneath the fur white and woolly; nose and lips white; ears erect, hairless, black tipped with white; tail prehensile, flesh-colored, almost bare. In general appearance the animal reminds one somewhat of a little pig. The Virginia opossum brings forth her young when they are very small, only about half an inch long; as soon as one is born the mother places it in her well-developed pouch, where it and its brothers and sisters are kept several weeks—sometimes there are a dozen to carry about and provide with milk. The little ones sleep and eat and grow. Perhaps by the time they are the size of rats and able to ride on her back there will be a second brood in the pouch. There are two or three litters a year. As great eaters, opossums may again be likened to the pig: they eat everything and anything: insects, wild fruit and berries, varied with roots, reptiles, crayfish, eggs, small rats and mice, with additions of poultry, corn, sweet potatoes and other farm-yard delicacies. As enemies of the destructive cotton-rat they are highly valued. They hunt mainly by night, sleep by day, live in trees. They are expert climbers; in going up a tree they use tail and hand-shaped feet very much as does a monkey. They dislike cold, seldom come forth when snow is on the ground, remaining in their dens for warmth and comfort, having stored away fat for this time of need. The opossum's habit of feigning death when frightened or slightly injured is well-known, and in this he is a consummate actor—lies stretched out motionless, breathless, nose colorless, white lips apart and the teeth gleaming stark, deathlike. See Stone and Cram: *American Animals;* Hornaday: *American Natural History.*

Op'tics. See LIGHT, TELESCOPE, CAMERA EYE, OPERA-GLASS, MICROSCOPE, PHYSICS.

Or'acle, in ancient times a revelation by some god in answer to questions, and also the place where the revelations were given. The revelations were usually made by the mouths of priests or priestesses, and sometimes by other signs. At Dodona the oracle answered by the motion of leaves or the murmuring of the waters of a fountain, and the oracle of Ammon responded by the shaking of the statue of the god. The Egyptian temples were nearly all oracles, and there were oracles among the Babylonians and Phœnicians. The most famous oracle of the Greeks was the one at Delphi. The inquirers offered sacrifices, walked around the oracle, with laurel crowns on their heads, and inscribed their questions on leaden tablets, many of which have been discovered. The answer was accepted as final and having authority, and usually was just and reasonable. Other oracles were at Ismenus, Delos and Olympia. See *Greek Oracles* by F. W. H. Myers and *Religious Antiquities* by Schomanns (translated).

taining hundreds of thousands of members. Ants of one community are not friendly with those of another; either they have nothing to do with them or quarrel with them. The work of a community is wonderfully portioned out. There are big workers and little workers. In some species there is a class that does the fighting, a soldier class. In a colony are the females, which are largest in size: the males; and the workers or nurses, which are the smallest.

After the pairing season the males are allowed to stray away and soon die. The females and workers are very long-lived. The queens are carefully guarded by the workers, but occasionally one of them escapes and founds a colony. There are four

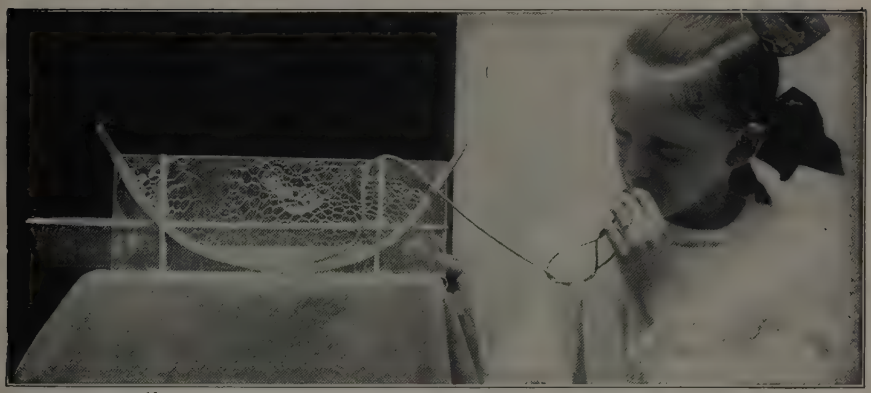
builders of their wonderful colonies with their houses and streets, by processes of mining, masonry and carpentry. The mining ants dig long galleries in the clay, removing the rubbish, building pillars to support the work and covering the whole with a thatch of grass stems. The red and yellow field-ants are the masons. They first raise pillars and then spring arches over them, covering them with the loose piles of soil which we know as ant-hills. The carpenter ants bore their cells in the solid timber of trees, side by side, with partitions no thicker than paper. A kind of ant in Australia builds its houses of leaves fastened together with a kind of glue. Ants are very strong, carrying animals for

Red Wood Ant. 1 Male. 2 a and b, Worker magnified. 3 Female. 4 Worker's head. 5 Larva. 6 Shelter of Pupæ, so-called ant-house. 7 and 8 Pupæ magnified.
Horse Ant (natural size). 9 Worker. 10 Male. 11 Female.

stages in the life history of ants: egg, larva, pupa and perfect insect. The eggs are laid by the queen and carried about by the workers or nurses, exposed to the sunlight during the day and protected from the dampness at night. As soon as the white, legless larvæ are hatched, they are treated in the same way, being fed by a liquid from the stomach of the nurse, until they reach the proper age to spin their own cocoons around them. The cocoons represent the pupa stage; they are commonly called ant-eggs, and are carefully tended by the workers. When ready for their second birth, the young ants are cut out of the inclosing cells.

The workers are the most interesting of the three classes of ants. Besides acting as nurses, they supply all the food and are the food, or masses of material several times larger than themselves. They eat various kinds of food, both vegetable and animal, other insects, honey, sugar, fruit, etc. They are fond of the honey-dew produced by little insects called aphides, and some kinds of ants capture these insects and use them as milch-cows. Many ants live on decaying vegetable and animal matter. In some hot countries are large, flesh-eating ants, which move in swarms over the land, searching for insects of all kinds, each carrying his prey. In South America, when a swarm is seen approaching, the people leave their houses and let the ants clear out the insects which infest them. In Texas is a kind of farming ant, which is said to plant, cultivate and harvest a kind of grain, laying it up in cells

HOW HONEY COMB CELLS ARE MADE



Courtesy Technical World.

This picture of the little girl blowing soap bubbles illustrates the latest answer of science to one of Nature's oldest conundrums:

"Why are the cells of the honey comb six sided?" Look at the bubbles and see if you can't find this answer before I tell you.

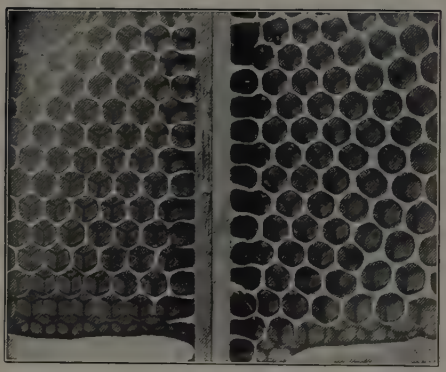
Ever since King Mykennos of Egypt made his royal sign in sealing wax with the image of the bee in his ring—and long, long before that—men have kept and studied bees and spoken of their wonderful instinct in making their cells six-sided. Round cells waste space; six-sided cells make use of all the space and make the comb stronger because the cells support each other better.

Now it is pointed out that the bees make the cells round in the first place; as you can see in the next picture they grow six-sided as the frames fill. So it is the pressure of the cells against each other that makes them six-sided, just as the pressure of the soap bubbles is changing them from round to six-sided figures. The soap bubbles do not take an equal sided shape because they are not strong enough and last too short a time.

A comb of 4000 cells is made in twenty-four hours. (How many cells an hour?)

After the breeding season the cells are built out longer and turned up at the end to keep the honey from spilling out until the cells are filled.

This picture shows the frames which are used in artificial hives. The bees begin to build the comb from the top of each section. When filled with honey, the bees seal the cells with wax. The frames are easily lifted from the hive at the convenience of the bee-keeper.



This picture shows how these cells will look under the microscope; and it shows something else. Notice that the point of meeting of the three sides of three cells is just opposite the center of the cell in the other side. Any carpenter, architect, mechanical engineer or your big brother in High School will tell you that this greatly increases the strength of the comb. You can see this back to back arrangement of a comb if you will hold one up to the light.

The queen bee reigns in the hive, and is treated with reverent courtesy and attention. When she moves about she is attended by a body guard, as seen in the picture. They form a circle about her with all their heads towards her. They walk backwards before her, and when they retire they move backwards, still facing their queen. They feed her with honey and bee-bread.

This picture shows that combs are not made only to hold honey, but to brace the little bee city—for that is just what a honeycomb is—so that it can't fall or be shaken down; as cities built by men sometimes are when they are shaken by earthquakes or struck by whirling winds.

If you ever find a beehive in the hollow of a tree, you will find these braces protecting it against the swaying of the trees in the wind. You will not find them in artificial hives.

When the workers go out into the fields fo pollen to feed the babies, they carry along "marke baskets." These baskets, as you see in this pictur are on the outside of each pair of hind legs. Bo body and legs are covered with hairs which colle the pollen. The bees scrape the pollen off one l with the other and put it into the basket. Yo have noticed the flies have the same habit. Be do most of their collecting within two miles of t hive. The pollen is first rolled into a ball befo it is dropped into the basket. The baskets a arched over with hairs to protect these little ba from falling out. Sometimes the bees roll in t flower so as to get themselves all covered wi pollen—just as you have seen horses roll, or a bi flutter dust over himself.

gable workers and very hard to discourage. Carpenter bee, digger bee, potter bee, cuckoo bee, honey bee, bumblebee—all are of much interest and well-worth close study.

The social bees, including the bumblebee and honey bee, are the best known. The latter was originally introduced from Europe into America, more than three centuries ago, and escaping swarms stocked the forests with

QUEEN BEE

what are now called wild bees. There are three kinds of individuals: the queens, the workers or undeveloped females and the drones or males. The queens and workers have stings connected with poison sacs, but the drones have no stings. Each kind is produced in a particular kind of cell. That in which the queen is reared is especially large. The undeveloped queens are provided with a kind of food called royal jelly. The cell of the drone is larger than that in which the worker is reared. It is possible, however, for the active workers to enlarge a cell that would ordinarily produce a worker, and by changing the food to royal jelly cause the young grub to develop into a queen. When several queens mature at the same time there is a royal battle among the rivals and the one who succeeds in stinging the other to death is left as reigning sovereign. The queens lay eggs in large numbers, placing in different cells those that are intended for workers, drones and new queens.

WORKER

DRONE

The drones are males and are destroyed by the workers soon after the honey season. The workers do all the work of the hive. They gather the honey, bee-glue and pollen, which is made into bee-bread with which the young are fed. They clean the hive, form the wax, build the comb and care for the young. The formation of wax is very interesting. Some of the workers gorge themselves with honey and remain quiet for about twenty-four hours, after which the wax comes out as little plates from the wax pockets on the under surface of the body. About twenty-one pounds of honey are consumed to manufacture one pound of wax, but this amount will make about 35,000 honey-comb cells. The cells are six-sided; in building the same the workers begin at the top and build downwards, leaving some spaces for passage ways. Some of the cells are for honey, others for eggs.

The migration or swarming of the bees usually happens when the hive becomes too crowded. The first swarm, led by the old queen, usually starts out in June, leaving the new queen in possession of the hive. A second and third swarming sometimes take place. The swarm comes out, numbering thousands, and soon lights, usually on the limb of a tree, hanging like a bag, from which it may be taken and put into a hive.

"A swarm of bees in May
Is worth a load of hay.
A swarm of bees in June
Is worth a silver spoon
But a swarm in July
Is not worth a fly."

Before swarming takes place there is no little commotion in the hive. The queen (or, better, mother) of a hive is an indispensable member, and beautifully cared for by the others. But between queen and queen there is little friendliness, and when a new queen comes forth from her cell the old queen knows her day is over, she must leave and go off to establish a new home. Warning of the flitting is given by both new queen and old. At the sound of the piping of the former a thrill passes through the hive, the queen giving special sign of agitation. Swarming takes place on a fine day, and may be considerably retarded by cloudy weather. Some of the new hives may be opened, an observer having opportunity to study the condition of the swarm and the progress of the work. Keepers often use little machines that puff smoke into the hives, this making the bees quiet without hurting them, and allowing the keeper to handle them. Bees become quite tame when handled often.

The sting is at the extreme end of the abdomen. The poison, pumped from the poison-sac with great rapidity, exudes from the many infinitesimal barbs of the dagger-like sting. The angry bee, leaving her sting behind in her victim, falls a victim, too, and shortly dies. A person stung should immediately remove the sting, which retains poison. The bee's tongue is a delicate and complicated instrument, which, when not in use, is folded back beneath its head; when active, working with lightning flash. For especially deep, tubular flowers there is an extra length of tongue that can be shot out from within. The tongue is hairy and there is a little, spoon-like termination. Some of the nectar taken up is eaten and digested; some stored in the honey-sac, situated in the big end of the abdomen. This and the pollen are taken home for the good of the community. Pollen accumulates in dust on the feathery hairs of legs and body, later to be collected in the two pollen baskets, one on the fourth joint of each hind leg. The worker gathers the pollen together with her legs, then scrapes it with one hind leg into the basket of the other leg. It is most interesting to watch her gathering pollen. "Sometimes she looks as if she were running about over a head of flowers to find something she had

amber, resin and salt, and lampblack makes the fire red. Firecrackers, torpedoes, Roman candles, rockets, wheels etc. are among the common fireworks. The present form of fireworks, of course, does not go back of the invention of gunpowder; but the Chinese, who excel in the manufacture of them, had some form of them in use from an unknown period.

Fish-Culture. The importance of fishes as food has led to the formation of commissions by different governments for their care and spread. The culture and protection of certain kinds of fish was practiced as a private enterprise from 1750 onward, but the first public hatcheries were established in France in 1850. Soon after, in 1865, fish-hatching began in the United States, in New Hampshire, Vermont and Massachusetts. The United States now gives greater attention to the culture, propagation and spread of fishes than any other nation. A United States fish-commission was created in 1871, with Spencer F. Baird as fish commissioner. Attention was very early given to the propagation of shad, and the number of those fish greatly increased. In 1880 the rivers of Georgia were stocked with shad, and in the course of four or five years they were caught there in abundance. In 1890 the catch of shad along the Atlantic coast was two and one half times as large as in 1880. The government pays for the support of the United States fish-commission about $150,000 annually; and, in addition, more than 30 of our states support state fish-commissions.

The work of preserving and increasing our food-fishes consists in keeping the waters free from contamination by mills, sewage and other causes; in establishing laws to control the methods and seasons of fishing, in the cultivation of proper food-elements; and in the hatching and distribution of the young fish. Fish-breeding is practiced in many fish-hatcheries. The eggs are sometimes collected from the spawning-grounds; at other times fishes are obtained in a ripe condition and the eggs are pressed out by running the thumb along the under surface of the abdomen. The milt is then pressed out from the male fish and spread over the eggs. Thus they are artificially fertilized, and it is found that by this method a much higher percentage of the eggs is fertilized and developed than in the natural spawning-grounds. The eggs are now protected and reared in boxes and jars provided with running water. In some cases the young are fed by finely divided liver or other suitable food. After they reach a certain size, the young fish are shipped, and distributed in lakes, rivers and ponds. The United States government hatcheries yield over five billion eggs and young fish each year, and the states contribute about the same amount. Our supply has increased, and new kinds introduced in various sections of the country. Fishes ha also been transported across the ocean; c trout have been carried to Japan and Gre Britain, and we have received salmon a trout from Europe. Shad and striped b have been carried from the eastern to t western districts, white-fish fry have be extensively planted in the great lakes, a the range of black and striped bass a other fish has been greatly extended. T extent of the work of distributing fish great. Some of the states (Michigan, W consin, New York, Pennsylvania) ha distributed from 40,000,000 to 135,000,0 of fish in a single year. The term fi culture and the work of the United Sta fish-commission have broadened to t in the protection and care of the seal-fi eries, of lobsters, oysters etc. See various publications of the United Sta fish-commission.

Fish, Hamilton, American diplomat was born at New York on Aug. 3, 18 graduated at Columbia College, and admitted to the bar in 1830. He a Whig in politics, was elected a congr man in 1842, lieutenant-governor of N York in 1847 and governor in 1848. 1851 he was returned to the United Sta senate, and acted with the Republi party. From 1869 to 1877 he was secret of state under Grant, signing, as one of commissioners, the Washington treaty 1871, which settled the Alabama quest He died at Garrison's, N. Y. on Sept. 7, 1

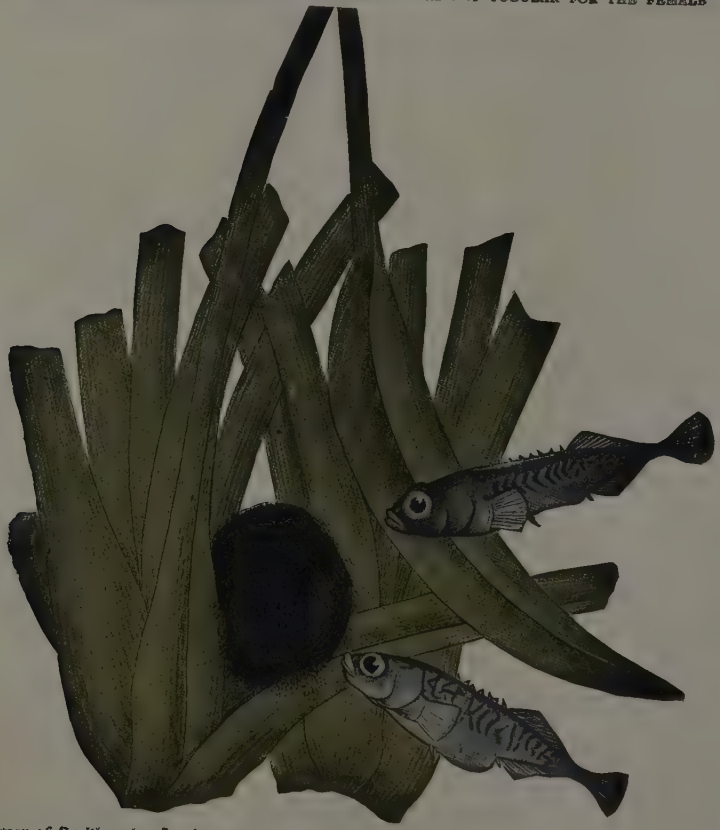
Fish'er, George Park, an Ameri clergyman and church-historian, was b Aug. 10, 1827, at Wrentham, Mass. graduated from Brown University in 1 and, after a course of study in Germ was made professor of divinity in College in 1854 and of ecclesiastical his in 1861. Among his best-known writ are *History of the Reformation, Beginn of Christianity, Grounds of Theistic Christian Belief* and *Nature and Me of Revelation.*

Fisher, Admiral Sir John Arbuth was born in 1841, entered the British n in 1854, and took part in the captur Canton and the Peiho forts in 1860. served in the Crimean, Chinese and E tian Wars, commanding *The Inflexibl* the bombardment of Alexandria in 1 He has successively occupied the follo posts: Director of Naval-Ordnance (1 91); Admiral-Superintendent of Portsm dockyard (1891); Lord of the Admi (1892–7); Commander-in-Chief on the N American and West Indies station (189 delegate to the Hague peace-confer (1899); Commander-in-Chief on Medit nean station (1899-1902); second Sea-Lo the Admiralty (1902-3); Commander-in- (1903-4); first Lord of the Admiralty (19 1915). He died in 1920.

GROUP OF FISHES

Land-locked Salmon. Common Mackerel. Weak-fish. Striped Bass. Shad. Bluefish. White-fish.
Canada Red Trout. Brook Trout. Wall-eyed Pike.

STICKLEBACK MALE ROTATING IN HIS NEST TO MAKE IT TUBULAR FOR THE FEMALE



Courtesy of Smithsonian Institution

FEMALE PREPARING TO ENTER A NEST TO LAY HER EGGS

OUTLINES

NATURE STUDY

SPECIAL REFERENCES:

a. **As related to child life:** 1307.
b. **Nature study in the lower grades:** 1307.
c. **Material:** 1308.
d. **Methods:** 1308.
e. **The Camera in Nature Study:** 1309.

I. ANIMAL LIFE.

1. **MAIN CLASSES OF ANIMALS:** Animal kingdom 74; arthropoda 114; vertebrates 2015; tunicates 1950; geology 2133.
   a. **Insects:** Illustrations — flies 687; "darning needle" or dragon fly 549; scarabæus or tumble-bugs 1687; butterflies 296; hornets 886; silkworm moth 1757; chinch-bug 389; potato-bug 1537; fire-fly 676; peripatus 1453; cockroaches 418; cochineal 417; canker or fire worm 322.
   b. **Fishes:** 678; trout 1945; bass 179; cod 418; salmon 1666; perch 1451; pike 1490; haddock 821; mudfishes 1274.
   c. **Amphibians:** Frogs 719; toads 1917; and salamanders' 1664.
   d. **Reptiles:** 1601; snakes 1773; alligators 52; lizards 1104; tortoise 1925; turtle 1958; terrapin 1892; crocodile 480.
   e. **Birds:** 217; sparrow 1791; hawk 850; robin 1620.
   f. **Mammals:** 1154; cat 347; dog 538; elephant 604; monkey 1252; horse 886; house-pets 889.

2. **STUDY OF INSECTS:** 928.
   a. **Parts of an Insect:** 928; ant 76; bee 191 beetle 194.
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         (a) **Antennæ or feelers, what they are like:** Cockroaches 418; aphides or plant lice 82.
         (b) **Eyes:** Insects 928; dragon-fly 548.
         (c) **Mouth-parts:**
            1. **Upper lip and jaws:** Beetle 194; weevil 2064; ant-lion 81.
            2. **Parts for biting and for sucking:** 929; Butterfly 297; caterpillar 350; waterbug 2052.
      (2) **Thorax:** 928.
         (a) **The wings and legs:** Insects 929-30; crickets 477; grasshoppers 796.
      (3) **Abdomen and the way it is joined to the thorax:** 2050.
   b. **Stages through which most insects go in developing from the egg to the full-grown adult insect:** fly 687; mosquito 1269.
      (1) **The egg stage:** 928; 297; 350.
         (a) **Number of eggs:** Bee 191; mosquito 1269.
         (b) **Where they are laid:** Bee 191; fly 687; mosquito 1269; moths 1270-71.
         (c) **When laid:** Moths 1270; crickets 477; grasshopper 796; lady-bug 1019.

(2) The larval stage—worm or caterpillar stage: Centiped 359; silkworm 1759; larva 1032; caterpillar 349.
  (a) Food of insects in this stage of development: 1032.
  (b) The stage in which the most damage is done: Army-worm 109; Cottonboll weevil 465.

(3) The pupal stage—cocoon: pupa 1564; butterfly 297; silkworm 1757.

(4) Winged stage—full grown: moth 1270; butterfly 297; lady bug 1019.

(5) The time of development from one stage to the next: Cicada or 17 year locust 398; katydid 993.

(6) In what form the insect lives from one summer to the next: mosquito 1269; codlin moth 419.

3. STUDY OF FISHES: 678; 677.

a. Some parts of the fish: Heart 853; 67.

(1) The gills:
  (a) How they are used in breathing: Respiration 1603.
  (b) Has the fish lungs? Mudfishes 1274; fishes 678.

b. How the fish is protected: sturgeon 1841; torpedo 1924; swordfish 1858; fish-culture 677.

c. Food of the fish: 678; 1734.

d. Fish-eggs: 677; 678.
  (1) When and where laid: 1827.
  (2) Number of eggs: 589, 678.

4. STUDY OF THE FROGS—AMPHIBIANS: 719; Animal life 524; amphibi 65; salamander 1664; egg 589; blood 401; heart 854.

a. Their development:

(1) Their Eggs: 1917.
  (a) Appearance: 1917.
  (b) Jelly-like part around the real eg inside and the two purpose of the jelly: Toad 1917.
  (c) Where they are laid: Salamander 1664.

(2) The Young Tadpole:
  (a) Its appearance at first: 719; 1917.
    1. Lack of legs 65.
    2. The gills 719; 65.
  (b) Why it cannot live on land: 71

(3) The Secondary Stage of Development:
  (a) Disappearance of gills and deve opment of lungs: 720; 65.
  (b) Development of a pair of hin legs, then a pair of fron legs: 720; 1917.
  (c) Shrinking of the tail: 720; 191

(4) The Full-Grown Amphibian:
  (a) Why and how can live on land 719.
  (b) Food of the Amphibians:
    1. Of what it consists.
    2. How it is obtained.
    3. The peculiarity of the tongu and how it is used in ge ting food.
  (c) Amphibians as destroyers of i sects: 1344; 1918.

5. STUDY OF REPTILES: 1601; 589.

a. Main kinds of reptiles: Snakes 1773; turtles 1958; alligators 52; lizard 1104; crocodile 480: dragon 548; chameleon 364; gila monster 76

war bird, though this name is given also to the albatross (*q. v.*) and other birds. It is very large, the spread of wings sometimes being ten feet, and has an extremely long, forked tail and a bill five inches long, hooked at the end. It has a pouch, which is inflated in flight and becomes bright scarlet during the breeding-season. In color the bird is blackish-brown with green and purple reflections; the feathers are much in use for headdress in the Pacific islands. Throughout the tropic regions the bird is met with, and it has been known to wander as far north as Nova Scotia. It is a true ocean-bird, seldom coming to land except to roost on trees near the breeding-quarters. The slightly-built nest is placed in a tree or bush, occasionally on the ground or bare rock, and contains one egg. It is said that both male and female incubate, sitting close together and snapping at any intruder. The flight of the frigate-bird is wonderfully swift and long-sustained. The birds are usually seen singly or in pairs. They do not dive for their prey, but with ease seize the surface-swimming birds that constitute their chief food; they also feed on squids, small crabs, flying fish and young turtles. They are adept as robbers, forcing terns and boobies to give up their prey and catching it before it reaches the water. It has been asserted that they pass from Africa to South America in a day.

Fro'bisher, Sir Martin, one of the great seamen of the age of Elizabeth, was born in Yorkshire about 1535. Sent to sea as a boy, he formed, at an early age, his lifelong dream of a northwest passage to Cathay. Following out this idea, he made three voyages to the region of Labrador. Later on he commanded a vessel in Drake's expedition to the West Indies, and covered himself with glory by his conduct in the struggle with the Spanish Armada. His later years were spent in scouring the seas for the treasure-ships bound from the New World to Spain. At the siege of Croyzon, near Brest, in 1594, he was wounded, and died at Plymouth, England on Nov. 7 of the same year. See *Life* by Rev. F. Jones.

Froebel (*frē'bel*), **Friedrich Wilhelm August,** a German reformer in education, was born in Thuringia, April 21, 1782. His early years were spent partly in study and partly in teaching, for which he had a marvelous fitness. His underlying idea in education was to follow nature in the unfolding of the pupil's mind; letting it grow and expand as a plant grows, according to its nature This idea he had an opportunity to carry out, when, in 1817, he opened a school at Griesheim, in Thuringia, which he soon transferred to Keilhau. He wrote a work explaining his views, and, with the object of extending his system, started several branch-schools and began to train teachers. In 1836 Froebel opened at Blankenburg, not far from Keilhau, his first kindergarten, a system of teaching children which has since become popular in all circles of education. The remainder of his life was spent in working out this new system. Froebel has exerted a great influence on education in this country, perhaps greater than either Pestalozzi or Herbart. His principal work is *The Education of Man*, translated by Josephine Jarvis. He died on June 21, 1852. For kindergarten see SCHOOL; MODERN EDUCATION; CHILD-STUDY; SELF-ACTIVITY; GAMES.

Frog, a common, tailless amphibian, with webbed feet, and hind legs adapted for leaping; hatching as a tadpole and passing from

STAGES IN THE LIFE-HISTORY OF THE FROG

a water-breather to an air-breather. The frog belongs to the same group with toads, salamanders etc. Its life-history is very interesting, because it represents that phase of animal life through which the race of higher animals must have passed in changing from water-animals to land-animals. There is good reason to believe that animal-life began with aquatic animals and that the terrestrial animals sprang from them. As is well known to embryologists, all the higher animals pass through a stage, in the egg, in which they have rudimentary gill-slits and gill-arches, with blood vessels arranged on the fish-like pattern. (See DEVELOPMENT.) The frogs hatch at the level of a fish, and, while leading an independent life, they pass through the stages that higher animals pass before birth. Frogs and toads are much alike; in the

made in 1903 at Pelican Island, Fla. Since then many others have been added and a national law passed for the protection of migratory birds. In 1916 a treaty with Canada brought the hunting season and protection afforded in the two countries into agreement.

Birds, a natural class of vertebrates. Other groups of equal value are Fishes, Amphibia, Reptilia and Mammals, each of which is called a class. Birds are distinguished from all other animals in that they possess feathers. They moult or change the feathers once a year. They are warm-blooded animals with a four-chambered heart; their lungs are connected with air-sacs, and the bones are often hollow with spaces which are connected with the air-sacs, to make them light for flight. Living birds have no teeth, but many fossil birds had teeth. The birds as a group are closely related to reptiles. There were, in geological times flying reptiles, and there is a bird (*Archaeopteryx*) found in the rocks of Bavaria that forms a connecting link between birds and reptiles. The largest living birds are the ostriches, but the great fossil birds (*Dinornis*) of New Zealand were from six to ten feet in height. There are several other extinct birds of very large size. In the world to-day there are between 13,000 and 14,000 species.

The best way to observe our common birds is with the help of opera-glasses. We should go into the fields and woods armed with opera-glasses instead of a gun. Quietly reclining under the trees, we may, with field-glasses, bring the birds near enough to see their colors and observe many of their habits. Besides their beauty, birds are highly useful, destroying numberless insects and acting as agents in cross fertilization and seed planting. A good book to help is Chapman's *Color Key to North American Birds*.

The modern classification of birds includes the extinct forms, and is too technical to give here, but the following arrangement may be found convenient: Our common birds are either (a) water birds or (b) land birds. The water birds include divers, swimmers, waders, and the shore birds, represented by loons, gulls, ducks, geese, swans, auks and pelicans, herons, storks, ibises, cranes, rails and snipes, sandpipers, woodcocks, plovers and killdeer.

The land birds are more numerous. Here the largest order is that of the perching birds, embracing many families and representatives, including most of the song birds. Flycatchers, kingbird, phœbe, larks, crows, jays, blackbirds, oriole, bobolink, meadow lark, cowbird, sparrows and finches, song sparrow, field sparrow, goldfinch, purple finch, rose-breasted grosbeak, swallows, waxwings, warblers, threshers wren, catkird, mockingbird, red thrush, creepers, nuthatch; the thrush family, blue [illegible]rd, robin, hermit thrush, etc. Other fa[illegible]ers and representatives of the land bird[illegible]ave the scratchers: common fowl, tu[illegible]ey, pheasant, grouse, pigeons and doves; [illegible]rds of prey: turkey buzzard, hawk, eagle, [illegible]wl, cuckoos, kingfishers, wood-peckers, [illegible]at-suckers nighthawks, whip-poor-wills, s[illegible]fts and humming birds. In addition t[illegible]the above are the running birds; ostriches, e[illegible]us, cassowaries.

See Chapman: *Bird-Life* (1899) and [illegible]ird *Studies with Camera* (1901); Davie: *Nest* [illegible]nd *Eggs of N. A. Birds* (5th ed., 1898); C[illegible]es: *Key to North American Birds;* Blanchan: [illegible]rds *Every Child Should Know; How to A*[illegible]ook *the Birds* (1902); *Bird Neighbors* (1[illegible]7); *Birds that Hunt and are Hunted* (1[illegible]8); Dugmore: *Bird Homes* (1900); Mer[illegible]m: *Birds of Village and Field* (1898).

Birds' Nests are primarily for rearing the young rather than for shelter. They sh[illegible]w a great difference in architecture, from the most rude to the very complex, and [illegible]rds may be divided into groups according t[illegible]he way in which their nests are built. The [illegible]n-ing birds either dig holes in the groun[illegible]for their nests or use holes already dug by [illegible]her animals. Thus the kingfisher digs a cro[illegible]ed gallery several feet into a bank and la[illegible]its eggs in a round hole at the end. Other [illegible]ds of similar habits are the common bank [illegible]al-low, the bee-eaters and the family of s[illegible]rm petrels. The wood-wren and the burro[illegible]ng owl make their nests in ready-made [illegible]ur-rows. Among ground-builders some [illegible]ild no nest at all, others only occasionally. [illegible]he nighthawks lay their eggs on bare gro[illegible]d, as a large number of sea birds do on the sand. The brush turkeys of Australia, c[illegible]ed mound builders, gather a large hea[illegible]of decaying leaves and grass, and when [illegible]he heap has become warm from rotting, [illegible]a hole about two feet deep in the top, an[illegible]ay their eggs, leaving them to hatch out b[illegible]he heat. Vultures and common fowls b[illegible]ng to this group. The masons build their [illegible]sts with walls or sometimes only coverin[illegible]of mud. The cliff swallows build flask-sh[illegible]ed nests against the sides of rocks or [illegible]fs. Several birds usually work at one nest, b[illegible]g-ing mud, while one of their number di[illegible]ts the work from within. The baker bi[illegible]of South America is the most skillful of [illegible]his class. It builds its nests very high, in [illegible]he shape of a baker's oven, with an entr[illegible]ce on the side twice as high as it is long, [illegible]nd the interior divided into two chambers [illegible]a partition. The common robin is allie[illegible]to this group. The carpenters bore hole[illegible]for their nests in trees. The woodpeckers [illegible]for example, dig with their beaks a short t[illegible]hel upward and then a larger hole downw[illegible]rd, in the middle of the tree, where the egg[illegible]re laid. The platform builders include [illegible]he eagle and pigeon. The level platform [illegible]of branches of trees and sticks built by e[illegible]les

A GOLDEN EAGLE AND A FLOCK OF CANADA GEESE

The golden eagle is without doubt our finest bird of prey. It was once hunted extensively for its plumes by both Indians and white men. The finest of the Indian head-dresses are made of golden eagle plumes. This great bird was never very abundant and it is now rigidly protected in the United States where it is to be found in the Rocky Mountains. Canada geese are very clever and able to look out for themselves. They have often been the victims of night shooting—an unlawful and atrocious practice—but in the daytime seem able to keep well clear of hunters' guns.

What is the most brutal of the dogs? 539.
What is one of the oldest dogs in Great Britain? 539.
In what country is a dog the poor man's horse? 539.
What dog is an irredeemable thief of food? 539.
What are the members of the cat family? 347.
What is the American wild cat called? 348.
What are the best known domestic cats? 348.
What kind of a cat has no tail? 348.
What was said of the black cat in the Middle Ages? 348.
What is the difference between a rabbit and a hare? 1577.
Where were 25,000,000 rabbits killed in a year? 1577.
What is the origin of the name hare-lip? 837.
What are the natural enemies of rabbits and hares? 837.
What immense injury results from the absence of natural enemies? 837.
What curious mistake is made about guinea pigs? 812.
What is the turtle dove? 1489.
How did Darwin use pigeons? 1490.
Is the carrier pigeon the one that carries messages? 1490, 341.
Are doves distinct from pigeons? 1490.

BIRDS.

How can bird houses be made cat proof? 1321.
How are birds unlike all other animals? 217.
Did birds ever have teeth? 217.
How many kinds of birds are there in the world? 217.
What is the best way to observe birds? 217.
Name some of the water birds? 217.
To what class do most of the song birds belong? 217.
What kind of a bird is a common chicken? 217.
What are the running birds? 217.
How do the mining birds build their nests? 217.
What bird lays its eggs on the bare ground? 217.
What are the mound building birds? 217.
What bird builds its nest like a baker's oven? 217.
How does the carpenter bird build its nest? 217.
What bird is locked up in its nest while hatching? 218.
What are summer and winter birds of passage? 218.
What man first saw birds of paradise in their native homes? 218.
Does the male or the female have the beautiful feathers? 218.
How many kinds of birds of paradise are there? 218.
What birds are never seen in flocks? 687.
What birds catch insects on the wing? 687.
What bird is unjustly accused of killing many honey bees? 1004.
What bird sings *pewit-phoebe?* 1473.
What bird has a dreamy note of *pee-a-wee?* 1463.
Where does the horned lark live? 1031.
What member of the blackbird family is called a lark? 1194.
Where do 40,000 crows assemble at one time? 482.
What birds does the jay imitate? 966.
Where is the red-winged blackbird found? 222.
What bird is called a locust bird and the ax-bird? 1813.
Are the orioles of the U. S. the same as those of Europe? 1394.
What bird is shot for the table as reed birds? 232.
Where is this bird called the rice bird? 232.
What is the "gladdest bird that sings"? 233.
What bird rides on a cow's back? 469.
What bird has three broods a year? 1791.
What is the American representative of the European kestrel? 1792.
What is the bluest bird that flies in North America? 923.
What bird is called the thistle bird and yellow bird? 778.
What bird feeds largely upon rice? 807.
What is the typical bird of the air? 1852.
What bird protects the negro's chicken yard? 1179.
What bird is called a swallow, but is more closely related to the humming bird? 1355.
How does the catbird sing? 349.

b. Snakes: 1773; rattlesnake 1588; copperhead 452; boa 231; cobra 417.
- (1) Color, scales and fangs: 1773.
- (2) Moulting of skin: 1773.
- (3) Means of movement: 1773.
- (4) Food:
  - (a) Of what it consists: rattlesnakes 1588; copperhead 452.
  - (b) How obtained: black snake 223.
  - (c) How digested: boa 231.

c. Turtles:
- (1) Protective covering of the turtle: 1958.
- (2) Different kinds of turtles: 19
- (3) Manner of swimming and diving: 1959.
- (4) Food, how obtained, of what it consists: 1959; 1925.
- (5) The eggs of the turtle: 1959; 89.

6. STUDY OF BIRDS:

a. Classification of birds: 217.

(1) As to zone on the earth where found:
- (a) Tropical birds: parrots 1425; birds of paradise 218.
- (b) Birds of temperate zones: hawks 850; crows 482; sparrows 1791.
- (c) Birds of cold climates: Auk 38; goose 780; migration 23; owl 1404.

(2) As to the habitat without regard to climate:
- (a) Water-birds:
  1. Divers: like the loon 536; gull 814; albatross 39; pelican 1442.
  2. Swimmers: like the duck 557; goose 780; swan 18
  3. Waders: like the heron 869; crane 473; and flamingo 680.
- (b) Shore-birds: like the snipe 1773; and plover 1505.
- (c) Land-birds: like the quail 1570; turkey 1995; robin 1620; and bluebird 231.

b. Things to notice in studying birds:

(1) Size — compared with some very common bird, as the robin which measures 10 inches: 1620; lark 1031; oriole 139

(2) Color:
- (a) Is it to attract attention like the Baltimore oriole's? 164
- (b) Is it for protection like the meadow larks? 1194.
- (c) Notice the differences in color between the male and the female: as in the bobolink 232.

(3) Notice the special markings: as in the plover 1505; the owl 1404.

(4) The shape: as in the loon 536; the flamingo 680; the em 613.

(5) The bill, wing, tail and feet: as in the pelican 1442; hummingbird 898; falcon 647; albatross 39; gull 813; peacock 34; condor 440.

(6) Movements on land: as skulking the rail 1581; walking the adjutant 14; running, the sandpiper 1674; ostrich 1398; ing, the divers 536: swimming, the ducks 557.

BALTIMORE ORIOLES AND NEST

PIGEONS.

1—Middle-billed Tumbler. 2—German Drum. 3—Anatolian Turbit. 4—Roman. 5—Coburg Lark
6—Antwerp Carrier. 7—Strasser. 8—Lynx. 9—Nun. 10—Maltese. 11—Carrier.
12—Long-billed Tumbler. 13—Fantail. 14—English Pouter.

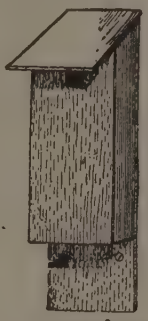
fibers. Recent observations have established a great law in reference to the development of nerves, viz., the sensory fibers arise outside and grow into the central nervous system, motor fibers start within the central nervous system and grow outward. This applies even to the highest developed sensory nerves. For example, the fibers of the optic nerve begin in the retina of the eye and grow toward the brain, instead of starting in the brain and growing outward to the eye. Besides sensory and motor fibers there are those that regulate the nutrition and the tone of organs, called trophic nerves; those that carry impulses which stimulate secretion, called secretory nerves; and some others. The twelve pairs of cranial nerves are as follows: The first pair connected with smell; the second pair with sight; the third, fourth and sixth pairs with muscles that move the eyeball; the fifth pair with the teeth, tongue and face; the seventh pair the muscles of the face, the eighth pair the ears; the ninth pair the tongue, as nerves of taste, and with the muscles of the pharynx. The tenth pair (pneumogastric) are very important and widely distributed, going to the heart, lungs, stomach and intestines. The eleventh pair supply certain muscles in the neck; and the twelfth pair form the muscles of the tongue. Besides all these, there are nerves belonging to the sympathetic nervous system. The object of nerves is to connect the different parts of the body with the controlling nervous system. They are simply conductors and not originators of nervous impulses.

Nesting-Boxes. Birds may be attracted about the home by putting up nesting-boxes. If new material can not be had, use waste or worn materials, for birds apparently prefer rusty metal or weather-beaten lumber. When I was a boy, I once secured four

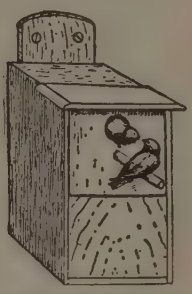
HOLLOW-LIMB BOX

BARK BOX

old shingles and a piece of board, made a rough box with hatchet and saw, and put it up in a tree. Many a pair of bluebirds nested there. Such a shingle-box may be put against the side of a building or on a tall pole or tree-trunk where cats can not easily climb. Better nail a shingle or some thin board flat on the top, and have it project on every side. If the board projects well out over the entrance, it will prevent the rain from driving in as well as make the roof rain-proof. When hollow limbs are pruned from a tree, cut them into sections, and roof, bore and mount them. (See first illustration.) A handsome as well as durable box may be made of bark. It must be made late in June, when the bark peels readily. It is made by peeling off both the outer and the inner bark. Then saw a slice off each end of the stick for the bottom and the top, tack the bark on the



BLUEBIRDS' BOX



SLIDING-COVER BOX

ends, nail on the supporting stick, and finally in order to make the top watertight, cover it with green bark. (See second cut.) These small boxes are suitable for the chickadee. Chestnut-bark makes strong boxes, that can be covered or roofed with zinc, for larger birds. An objection to many bird-houses is that they are not cat-proof. But a very deep box, without a perch, but with an overhanging cover or roof and with the entrance well up under the eaves, makes access difficult for the cat. The ordinary bird-house for martins or tree-swallows must stand on a tall, slim pole, these birds preferring to be 15 to 30 feet above the ground. Be sure not to make the entrance near the floor. Make a platform round the box, and rail the platform up at least three inches. Regulate the size and shape of bird-boxes by the shape and habits of the different birds. It is better to make them comfortably large than too small. The size of the entrance is most important. One and seven-eighths inches diameter will do for wrens; one and one-fourth for martins; three and one-half for flickers and screech-owls. Both bluebirds and tree-swallows have been known to nest in boxes hung from a wire. Provide every small nesting-box with a sliding cover, or a door, through which you can remove the contents. All the boxes I have mentioned, except shingle and bark boxes, provide for this, and these too

again answered in the negative, as it had been in the 18th century, and finally it was put to rest through the work of Pasteur, Tyndall and others.

In the latter part of the century experiments on living forms became prominent. The eggs, the larvæ and the older stages have been placed under different conditions of temperature, light, food, chemical and mechanical surroundings, and the effect of these changes watched. Many important facts have been brought to light by these experiments.

Biology is a body of rapidly expanding knowledge of intense interest and great service to mankind. Much was accomplished by it in the 19th century, but much more is to be expected in the 20th century.

For books about biology, see Sedgwick and Wilson's *General Biology*, Parker's *Elementary Biology* and Thompson's *The Science of Life*. Additional titles will be found under ANATOMY, BOTANY, ZOÖLOGY.

WM. A. LOCY.

Birch, species of the genus *Betula*, which consists of trees or shrubs, very widely distributed throughout the north temperate regions. The birches have usually a bark which separates in thin papery plates, and the long and pendulous catkins of flowers appearing in very early spring are well known. They grow in North America, Europe, North and Central Asia. Bailey states that no tree grows farther north than the birch. The Dwarf Birch is highly valued by the Laplander, furnishing him most of his fuel, and its tiny nut furnishing food for that bird so useful to the Laplander, the ptarmigan. The wood of many birches is inferior owing to the toughness of the bark interfering with the evaporation of the sap, its consequent fermentation and the crumbling of the wood. It makes excellent fuel; is used in manufacture, and is employed for furniture and small, common articles. Of the bark are made baskets, boxes, and that of the Paper Birch is extensively used for canoes; a dye is also made of it, and an oil which is used in the preparation of Russia leather. A number of birches are cultivated as ornamental trees, the weeping birch being extensively planted in this country. They are graceful of form, fair appearing from bark to least tremulous leaf. They are easily propagated by seeds and grow rapidly.

The American White Birch has a short life, but is a graceful tree and plucky one, springing up in deforested land and abandoned fields. It grows south as far as Pennsylvania. It is a small tree, from 25 to 45 feet high, the bark smooth and white, not readily peeling; foliage tremulous; dark green, triangular leaves, turning yellow in autumn. Recently the wood ha come into value, found useful as wood pulp, for shoe-pegs and spools.

The Canoe Birch or Paper Birch is one o the largest and most picturesque of th birches, and is widely distributed through out our northern states. It usually grow to a height of from 60 to 80 feet, some times reaches to 120 feet; its bark a con spicuous chalky white, which tears o readily in horizontal sheets. The leave are large and broadly ovate. This, a the name suggests, is the tree so friendl to the Indians, giving them bark for the famous canoes, for their shelters, and fo their household utensils, giving them fue that quickly crackled and flamed; eve giving them food, they making this use o the layer between wood and bark (cam bium).

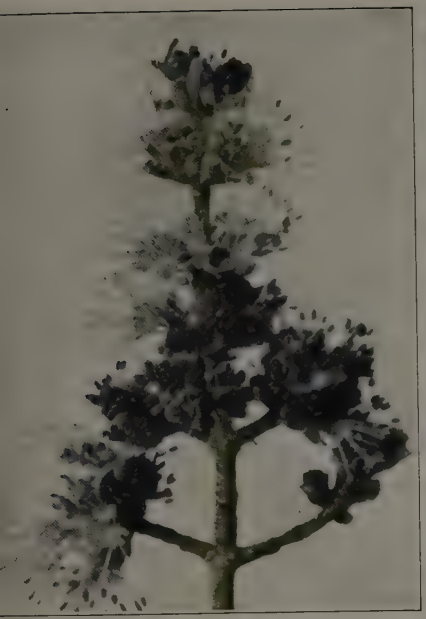
"And the tree with all its branches
Rustled in the breeze of morning,
Saying with a sigh of patience:
'Take my cloak, O Hiawatha!'"

The Indians to-day still make cano of birch bark, baskets and various othe articles thereof. The bark, as is we known, tears off in thin sheets of sever layers, the thinner ones being frequent used as letter paper, a use of birch ba going back to ancient times. The peelin of the bark by careless hands, cutting t deep, results in the loss of many good trees, whose far-gleaming white colum have proved their undoing.

The Cherry Birch is a comely and usef tree also known as Sweet Birch and as Bla Birch. It grows from 50 to 80 feet high, a is noted for its grace. The bark is da brown, the leaves, from two to five inches lo are oblongovate. Early in the spring t Black Birch is all aglow with yellow catki is golden in the fall, and in the summer be an abundance of glossy foliage. In the spri the wintergreen flavor of the saplings is ve pleasant. The sap is made into birch be and from the inner bark are obtained salicy acid and wintergreen oil. The hard, stro wood, of good red-brown color, is used furniture, and for wheel hubs and fuel. The range of the tree is from Newfoundland to Ontario, south to Florida, Tennessee and Kansas. Other varieties are the Yellow Gray Birch and the Red or River Birch. Bailey: *Cyclopaedia of American Horticul* and *The Tree Book* by Julia E. Rogers.

Bird Day, a day set apart for the pose of interesting boys and girls in bird birds and in bird protection. The of Bird Day originated with Profe C. A. Babcock of Oil City, Pa., in 1 Bird day was observed in Oil City in 1 In some states Arbor and Bird Day are served as a single festival.

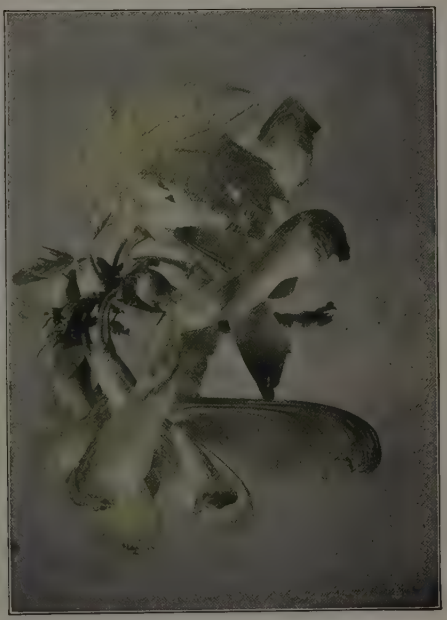
Bird Protection, nature lovers had been working for federal protection of b but the first distinct bird reservation



FLOWERS OF RED MAPLE.

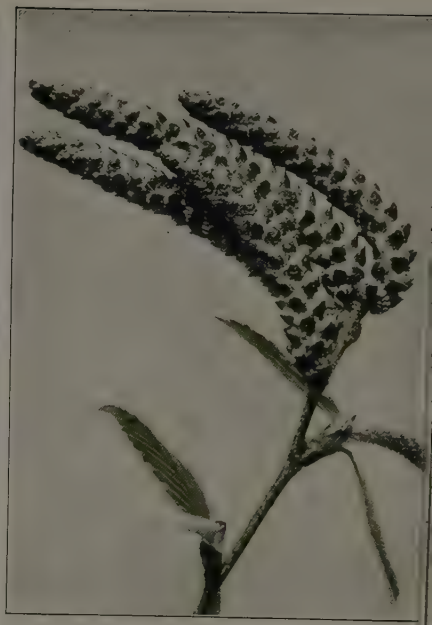
SILVER MAPLE FLOWER.

SUGAR MAPLE.



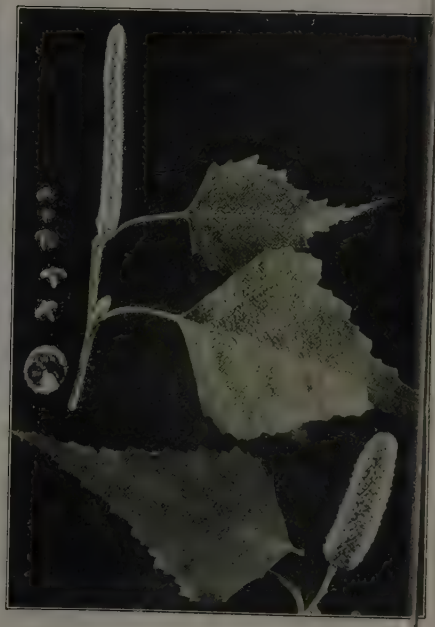
SILVER MAPLE.

RED BIRCH.



CHERRY BIRCH.

YELLOW BIRCH.



WHITE BIRCH.

sepals are green and leaf-like, but usually small as compared with the next set. The inner set of floral leaves is the corolla, the individual parts being called petals. It is the corolla which usually gives the display of the flower, the petals becoming delicate in texture, comparatively large in size and variously colored. The outermost set of sporangial leaves is composed of the stamens. Each stamen usually consists of a stalk-like portion, called the filament, and a pollen-bearing portion, called the anther. The anther contains usually two pollen-sacs, and the sterile tissue between them is often called the connective. The pollen-sacs are sporangia, and the pollen-grains are asexual spores. It was once thought that the stamen is a male organ, but it is merely a leaf modified to produce spores; in other words, it is a sporophyll (which see). The inner set of sporangial leaves is composed of the carpels, one or more of which may occur in the flower. Several carpels may unite to form one structure, or each carpel may remain distinct from the others, or there may be but one carpel. In any event the individual structure, whether made up of several carpels united together, or of separate individual carpels, is known as the pistil. This pistil usually develops in three regions: a bulbous base known as the ovary, which contains the ovules, which after fertilization become seeds; above the ovary there usually is a slender, beak-like prolongation, known as the style; and on the style there is developed the receptive structure known as the stigma, which receives the pollen. It was once supposed that the pistil is the female organ of the plant and that it contrasts with the stamen or male organ. It is now known that the carpels are sporophylls, that is, leaves set apart to produce sporangia, in this case the sporangia being the ovules.

Not all flowers possess all of these parts. For example, one of the sets of floral leaves may be absent, when the flower is said to be apetalous; both sets of floral leaves may be absent, when the flower is called naked; the stamen-set may be lacking, when the flower is said to be pistillate; the carpels may be lacking, when the flower is said to be staminate. In case the floral leaves are present, but cannot be distinguished from one another as calyx and corolla, it is common to speak of them all together as the perianth, as in the lilies. Very frequently the members of the same set may coalesce with one another; for example, the sepals may organize together to form a cup-like or tubular calyx. The petals may organize in a similar way, the corolla appearing like a bell, a trumpet, a tube etc. When sepals are thus united, the flowers are said to be gamosepalous; when the petals are united, the flowers are said to be monopetalous or gamopetalous or, best of all, sympetalous. When the filaments of the whole set of stamens are united, the stamens are said to be monadelphous. When the carpels are united, the pistil is said to be syncarpous. The word which contrasts with sympetalous, as indicating the opposite condition, is polypetalous; and the contrasting word for syncarpous is apocarpous. Another very common modification is that in which the sepals, petals and stamens seem to arise from the top of the ovary, the latter appearing outside the flower below the other parts, as in the common honeysuckle. Such a flower is said to be epigynous, and the ovary is often described as being inferior. The term for the contrasting condition is hypogynous. Flowers are often also irregular, the members of the different sets, notably the petals, not being all alike. This results in the formation of two-lipped flowers, spurred flowers etc. This condition of irregularity is known as zygomorphy, and the contrasting term applied to a regular flower is actinomorphy. The great purpose of the flower, with more or less conspicuous floral leaves, seems to be to secure pollination by means of insects. See POLLINATION.

JOHN M. COULTER.

Flowers, National and State, Long years of association, give the flowers of a nation their peculiar significance. It is said the shamrock holds its place in the hearts of the Irish because good St. Patrick one day, whilst preaching, used as illustration the three little leaves in cluster. Mention of England's national emblem at once brings up the Wars of the Roses at the ending of which the Tudor rose was agreed upon as the emblem of the country. Mention France's emblem, and the lily comes to mind, the *fleur-de-lis*, which not even Napoleon could make lose its hold on the people. Scotland and the thistle have long-time association; and as loyal as the Scotchman to the thistle is the Welshman to the leek.

The national flower of the United States has not yet been agreed upon; but various states have adopted floral or plant emblems: Kansas the sunflower; California the California poppy; Georgia the Cherokee rose; Minnesota the moccasin-flower; Alabama, goldenrod; Arizona, sequoia cactus; Arkansas, apple blossom. Colorado, columbine; Connecticut, mountain laurel; Delaware, peach blossom; Idaho, syringa; Illinois, violet; Indiana, carnation; Iowa, wild rose; Kentucky, blue grass; Louisiana, magnolia; Maine, pine cone; Michigan, apple blossom; Mississippi, magnolia; Montana, bitter root; Missouri, goldenrod; Nebraska, goldenrod; New Jersey, sugar maple tree; New York, rose; North Dakota, goldenrod; Oklahoma, mistletoe; Oregon, Oregon grape; Rhode Island, violet; South Dakota, pasqueflower; Texas, bluebonnet; Utah, sago lily; Vermont, red clover; Washington, rhododendron; West Virginia, rhododendron; Wisconsin, violet.

high plateaus has an extreme breadth of 1,000 miles. Between the main range and the Sierra Nevadas, lies a high table land called the Great Basin, which includes Utah, Nevada and parts of Arizona and New Mexico. The highest peaks are, in Alaska, Mount McKinley, 20,464 feet, Mount Saint Elias, 18,024 feet, Mount Wrangell, 17,524 feet; in the Sierra Nevada range, Mount Whitney, 14,898 feet; in the Cascade range, Mount Shasta 14,510 feet, Mount Rainer or Tacoma, 14,526 feet; in Mexico, Orizaba, 18,250 feet, and Popocatapetl, 17,520 feet.

On the east coast is the Appalachian range, which is lower than the Rockies and runs parallel to the Atlantic, but further from the coast line. Appearing first in the Wotcish ridge of Labrador, it extends to the table lands of Alabama. The White Mountains, Adirondacks, Allegheny and Blue Ridge Ranges belong to this system. Mount Mitchell in North Carolina, 6,688 feet, and Mount Washington, in New Hampshire, 6,293 feet, are the highest peaks.

Between these two mountain systems is the great central plain, stretching from the Arctic Sea to the Gulf of Mexico. The eastern and southern portions of this great plain are, or originally were, heavily timbered. The central portion on both sides of the Mississippi and stretching west to the higher planes of the Rocky Mountain system is the great prairie country, level or slightly rolling, nearly treeless, with a deep and wonderfully fertile soil. East of the Appalachian range is a region of hills and valleys, known as the Piedmont region, sloping down to a wide coastal plain, with low, swampy lands on some portions of the coast. On the Pacific Coast is a narrower but rich and productive region, rising to the western slopes of the mountains, and running through California, Oregon and Washington up into British Columbia.

The southern end of the continent through Mexico is chiefly a great tableland, reaching an elevation of 8,000 feet, dropping abruptly on the east to the Gulf of Mexico, and sloping more gradually to the Pacific. A low level is reached at the Isthmus of Tehuantepec. The greater part of Central America, including Guatemala, Honduras, Salvador and northern Nicaragua, is mountainous, sinking in southern Nicaragua to 100 feet above sea level, where is Lake Nicaragua.

Animal and Vegetable Life. The animals of North America possess hardly a feature in common with those of South America. In many respects they stand closely related to those of northern Asia. Among distinctly North American animals are the alligator, bison or buffalo, beaver, Eskimo dog, grizzly bear, moose, muskox, puma or panther, rattlesnake, reindeer and white mountain-goat. There are also black, brown and polar bears, deer, the wolf, fox, raccoon, opossum, prairie dog, otter, marten, lynx badger, and many other animals which are similar to those of Europe and Asia.

Of birds and wild fowl more than 2,000 varieties have been catalogued. Among the larger kinds are the eagle, vulture, turkey buzzard, hawk, crow, wild turkey, the heron, the flamingo, the wild goose, the crane and the pelican.

Specific trees include the boxwood, cypress, hickory, magnolia, mahogany, palmetto, pecan, redwood, sequoia. There are also vast forests of pine, spruce, fir, hemlock, cedar, as well as oak, ash, maple and many other varieties of hard wood. Of plants and vegetables, cotton, cactus, maize, orchids, peppers, pineapples, plantains, potatoes, sugar cane and yams are natives of America, and here are the great grain fields of the world.

Climate. Stretching as it does from the arctic to the tropical zone, North America presents every variety of climate. In the extreme north the ground remains frozen through the year, the short summer suffices to warm the surface and produce a meager vegetation. The temperate region is subject to wide ranges of temperature, giving four seasons, a frigid winter, mild spring and autumn and a hot summer, while the southern portion presents the usual characteristics of the tropics. Moreover, the temperature on the Atlantic coast and the interior is more variable than on the Pacific coast, where the climate is modified and made equable by the warm winds from the Pacific. The climate of the western coast is more like that of the western coast of Europe.

The rainfall is heaviest on the Gulf coast and lower Mississippi Valley, where the south winds bring in the moisture-laden air from the Gulf; and on the more Northern Pacific coast, where the prevailing winds are from the ocean. On the Atlantic and westward to the upper Mississippi Valley and north of the great lakes, the rainfall is ample for vegetation, while east of the Rocky Mountains, remote from the Gulf and on the lower Pacific coast, there are large semi-arid areas.

Minerals. North America is rich in minerals. Immense deposits of gold, silver and copper are found in the Rocky Mountain range, from Alaska, through Mexico and rich but less extensive fields in other parts of the continent. North America stands first of the continents in the production of silver, and second and nearly equal to Africa in the production of gold. The United States alone produces more than one third of the world's coal, more than half the world's copper and almost one half the world's iron. Excepting tin, all the important minerals are found in North America in abundance.

GEOGRAPHY

I. THE EARTH AS A WHOLE:

1. THE SHAPE OF THE EARTH: 573; 745; 730; 451.
- a. Proofs that it is spherical: 573; 127.

2. THE SIZE OF THE EARTH:
- a. Length of circumference and diameters: 573.

3. MOTIONS OF THE EARTH:
- a. Rotation: 573; 451; 279; 730.
  - (1) What is meant by poles and axis: 573; 1516.
  - (2) The Pole Star and the Big Dipper: 1516; 186.
  - (3) Cause of daylight and darkness: 573; 1848.
  - (4) Longitude and Time. The Meridian of Greenwich: 1204; 807; 1114; 1913.
- b. Revolution:
  - (1) The Earth's orbit: 574; 451; 1000; 1344; 127; 796.
  - (2) The angle of inclination: 573; 1544; 2133.
  - (3) The cause of the seasons of the year: 574; 1715.

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- b. The oceans: Atlantic, 132; Pacific, 1407; Indian, 921; Arctic, 94; Antarctic, 77.
- c. The movements of the water of the oceans:
  - (1) Ocean currents — causes: 1369; 813; 1017.
  - (2) Tides — causes: 1910; 1259.
  - (9) Waves — causes: 2058.

5. MEANS BY WHICH THE EARTH'S SURFACE IS CHANGED:
- a. Work of volcanic forces:
  - (1) Geysers, hot springs, volcanoes, earthquakes: 762; 2027; 1805; 574.
  - (2) Rising and sinking of land: 2028; 749; 1483.
- b. Work of the atmosphere:
  - (1) The changes of the atmosphere: 33; 1931; 2094; 1833; 750.
  - (2) How it makes soil: 1778.
  - (3) The winds: 2094; Trade, 1931; monsoon, 1253; simoom, 1759; cyclone, 492.
- c. Work of running water:
  - (1) How it wears away the earth's surface: 747; 2051; 100.
  - (2) How it carries earthy material and deposits sediment: 518; 1240; 590; 2122; 53.
  - (3) The general effect of running water: 2051.
- d. Work of the glaciers:
  - (1) How they wear away the land: 770; 1206; 365.
  - (2) How they make deposits of rock and soil: 553; Soils, 1778.
  - (3) Which part of the Earth has been most affected: 750.

6. DISTRIBUTION OF PLANTS AND ANIMALS ON THE EARTH:
- a. Plants:
  - (1) Vegetation regions: Africa, 23; America, 59; Central America, 60; South America, 61; Asia, 119; Austria, 145; Europe, 633; France, 705; German Empire, 756; Mexico, 1215; Italy, 947; Spain, 1788.
  - (2) Control by moisture, soil, heat, latitude and altitude: Iceland, 911; Soils, 1778; Agave, 25; Crops, 29; Australia 142.
  - (3) How plants are adapted to conditions in which they live: 1501.
  - (4) The great deserts, grasslands and forests of the world: Africa, 22; Gobi, 776; Sahara, 1654; Mohave, 1247; Australia, 142; Pampas, 1415; Tibet, 1909; Texas, 1895; Central America, 60; So. America, 61; Black Forest, 222; Forest Reserves. 693; Russia, 1646; Mexico, 1214.

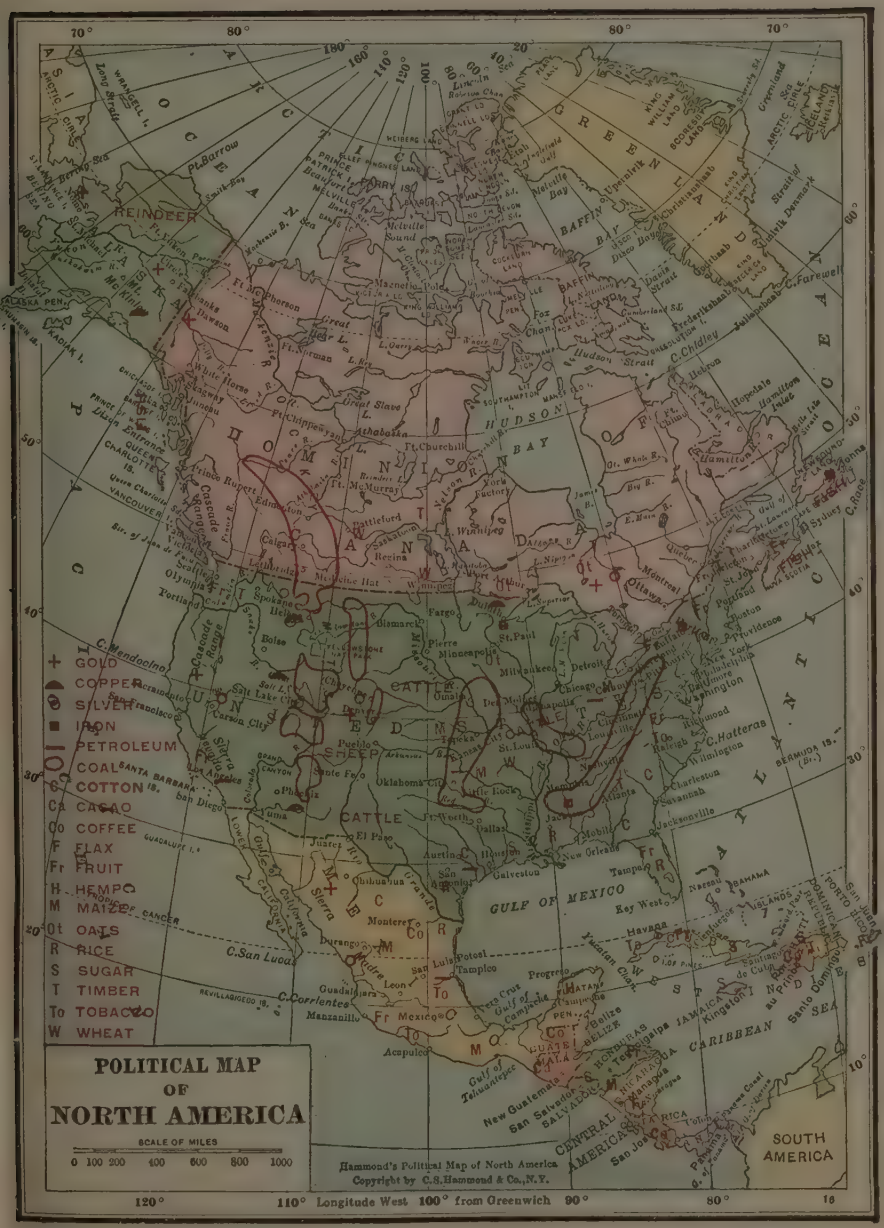
Where is the most notable tunnel in the U. S.? 885.
How does Boston rank in foreign trade? 249.
What mines have been worked in Connecticut since 1730? 444.
What is the character of silverware made in Rhode Island? 1607.

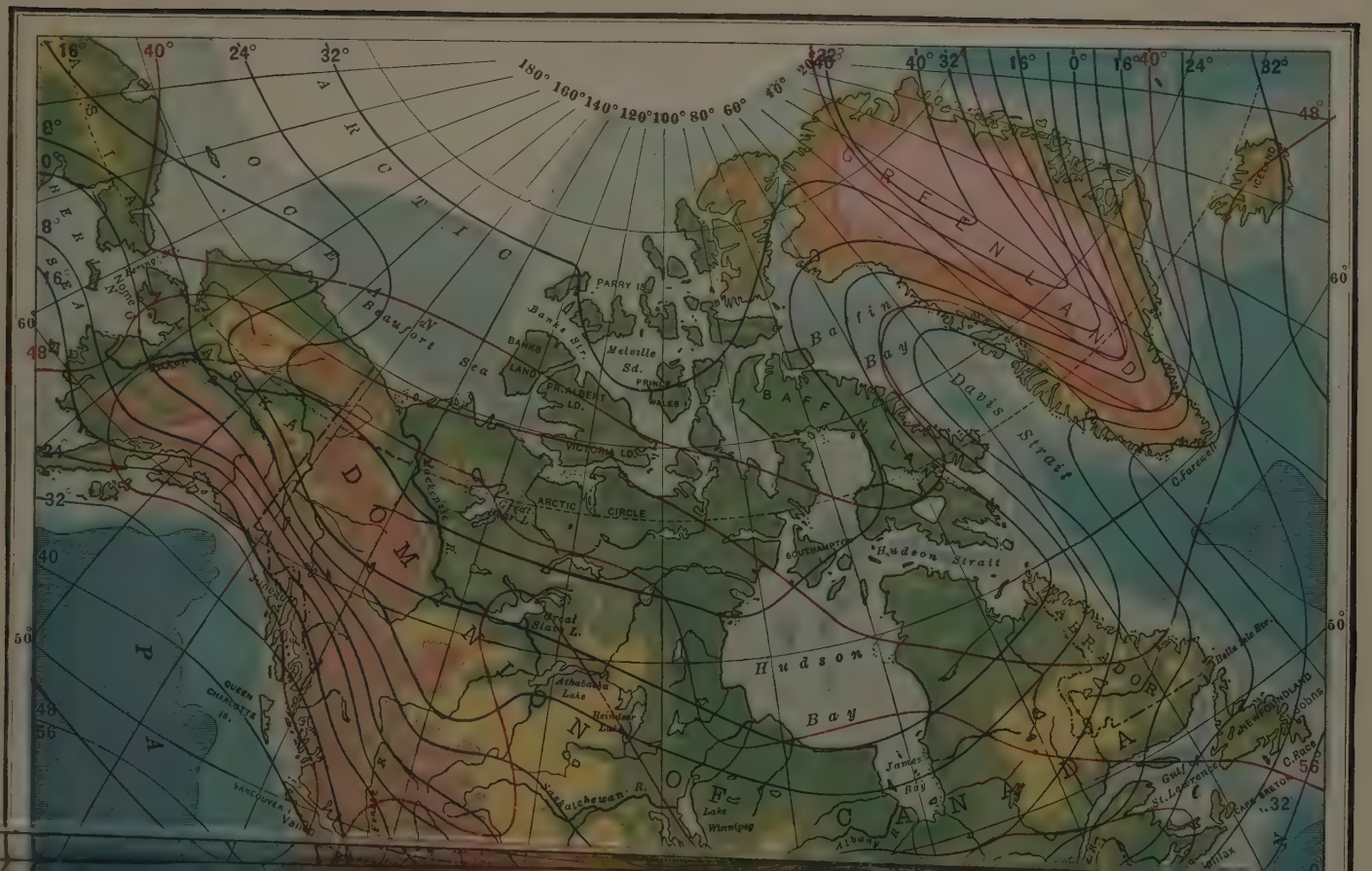
THE ATLANTIC STATES.

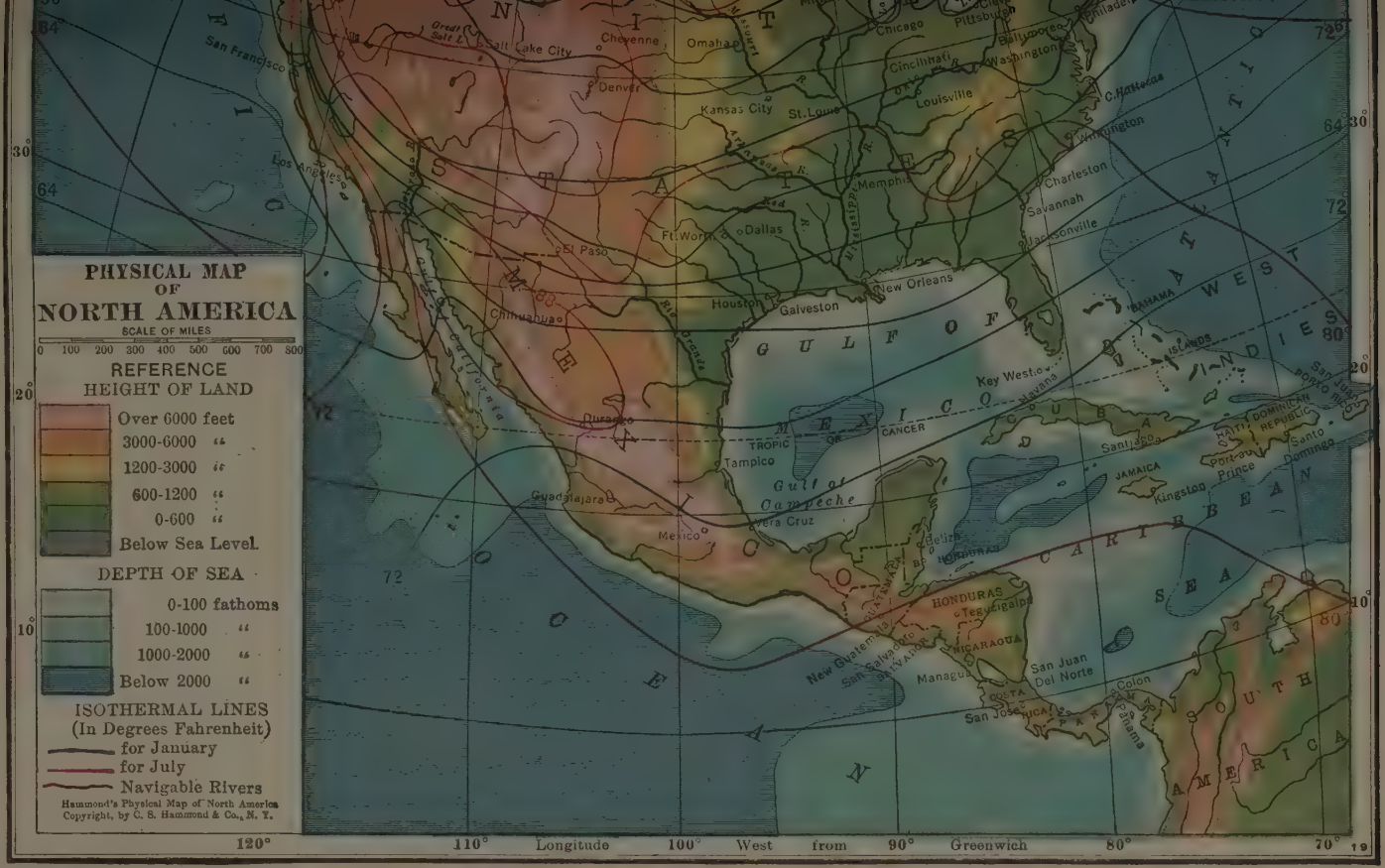
Why is New York the Empire State? 1331.
What enables New York to lead in manufactured goods? 1332.
What is the extent of exports and imports? 1333.
How many minutes does it take to walk across New York City? 1334.
What supports the weight of New York City? 1335.
What are the five boroughs of New York City? 1336.
What are the Palisades? 894.
How long is the Erie Canal? 321.
What two canals are used in New Jersey? 1328.
Where is the seat of the silk trade? 1327.
What river forms the entire eastern boundary of Pennsylvania? 1446.
Where are the largest Bessemer mills in the world? 1447.
How does Pennsylvania compare with New York in agriculture? 1448.
In what products does Pennsylvania lead all states? 1447.
What are the four divisions of the mountain systems of Pennsylvania? 1446.
What rank does Philadelphia hold as a manufacturing city? 1466.
Of what importance is Allegheny City? 51.
How does Delaware compare with Rhode Island in size? 516.
How does the Mason and Dixon line bound Maryland? 1181.
What is the leading industry of Maryland? 1182.
What two canals in Maryland? 1182.
What are the largest meat-packing industries on the Atlantic seaboard? 164.
What is tidewater Virginia? 2023.
What mines of Virginia are the largest in the world? 2023.
What two products are peculiar to Virginia? 2024.
What two natural wonders in Virginia? 2023, 1124.
Why is West Virginia called the Switzerland of America? 2071.
What is the area of the coal fields? 2071.

THE SOUTHERN STATES.

How does North Carolina compare in size with Pennsylvania? 1357.
Where are the government hatcheries? 1357.
How does it compare with Kentucky for tobacco? 1357.
What is said of its wonderful waterpower? 1357.
How does it lead the southern states? 1357.
What are the low country and the up country of South Carolina? 1784.
How does this state lead the world? 1784.
Where are the beds of phosphate rock? 1784.
Where is the safest harbor on the Atlantic coast? 371.
How does Georgia compare in size with New England? 752.
How many climatic belts in the state? 753.
Where is the famous Georgia marble found? 753.
What valuable cotton is grown in Georgia? 753.
Where is the largest tobacco farm in the world? 753.
Where is the leading naval stores port in the world? 1683.
How many clear days in the year in Florida? 684.
What are its most important crops? Minerals? 684.
What is the leading industry of the state? 684.
What are the Florida Keys? 684.
What is the greatest engineering feat of recent years? 684.
What city is built on a coral island? 1001.
What crop is grown in the famous black belt of Alabama? 35.
What rank has the state in iron ore production? 36.
How many miles of navigable rivers? 36.
What is the only seaport of Alabama? 1244.
How are funds raised for the levees in Mississippi? 1240.
What is the most valuable tree? 1240.


+ GOLD
COPPER
SILVER
IRON
PETROLEUM
COAL
C COTTON
Ca CACAO
Co COFFEE
F FLAX
Fr FRUIT
H HEMP
M MAIZE
Ot OATS
R RICE
S SUGAR
T TIMBER
To TOBACCO
W WHEAT
POLITICAL MAP OF NORTH AMERICA
SCALE OF MILES
0 100 200 400 600 800 1000
Hammond's Political Map of North America
Copyright by C.S.Hammond & Co.,N.Y.
SOUTH AMERICA
Longitude West 100° from Greenwich


ARCTIC OCEAN
GREENLAND
Baffin Bay
Davis Strait
Hudson Bay
Hudson Strait
BAFFIN LD.
LABRADOR
NEWFOUNDLAND
CANADA
DOMINION OF
PARRY IS.
Melville Sd.
PRINCE OF WALES
VICTORIA LD.
ARCTIC CIRCLE
Great Slave L.
Athabasca Lake
Reindeer Lake
Lake Winnipeg
Albany R.
James Bay
Gulf St. Lawrence
C. Farewell
C. Race
Belle Isle Str.
QUEEN CHARLOTTE IS.
VANCOUVER I.
Mackenzie R.
Yukon R.
Behring Str.
Beaufort Sea
Banks Str.
BANKS LAND
PRINCE ALBERT LD.
180° 160° 140° 120° 100° 80° 60° 40°
16° 40° 24° 32° 48° 56° 60°


PHYSICAL MAP
OF
NORTH AMERICA
SCALE OF MILES
0 100 200 300 400 500 600 700 800
REFERENCE
HEIGHT OF LAND
Over 6000 feet
3000-6000 "
1200-3000 "
600-1200 "
0-600 "
Below Sea Level
DEPTH OF SEA
0-100 fathoms
100-1000 "
1000-2000 "
Below 2000 "
ISOTHERMAL LINES
(In Degrees Fahrenheit)
for January
for July
Navigable Rivers
Hammond's Physical Map of North America
Copyright, by C. S. Hammond & Co., N. Y.
Longitude West from Greenwich
120° 110° 100° 90° 80° 70°
Pacific Ocean
Atlantic Ocean
Gulf of Mexico
Caribbean Sea
Gulf of Campeche
Bahama Islands
West Indies
Greater Salt L.
Salt Lake City
Cheyenne
Omaha
Chicago
Pittsburg
Philadelphia
San Francisco
Denver
Kansas City
St. Louis
Cincinnati
Washington
Louisville
C. Hatteras
Los Angeles
Memphis
Charleston
Savannah
Jacksonville
Ft. Worth
Dallas
El Paso
Chihuahua
Houston
Galveston
New Orleans
Key West
Havana
CUBA
Tropic of Cancer
Durango
Tampico
Guadalajara
Mexico
Vera Cruz
Belize
HONDURAS
Tegucigalpa
New Guatemala
San Salvador
NICARAGUA
Managua
San Juan Del Norte
COSTA RICA
San José
Colon
Panama
JAMAICA
Kingston
HAITI
DOMINICAN REPUBLIC
Port-au-Prince
Santo Domingo
PORTO RICO
San Juan
Santiago
Rio Grande
Rio Grande
Rio Colorado
Mississippi R.
Missouri R.
Ohio R.
Tennessee R.
Columbia R.

UNITED STATES
SCALE OF MILES
0 50 100 200 300
Longitude West from Greenwich
GOLD
SILVER
COPPER
LEAD
ZINC
IRON
PETROLEUM
COAL
C COTTON
F FLAX
Fr FRUIT
M MAIZE
Ot OATS
R RICE
S SUGAR
T TIMBER
To TOBACCO
W WHEAT
C.S.HAMMOND & CO., N.Y.

NATIVES OF NORTH AMERICA

1 Eskimo of Labrador 2 Eskimo Woman of Greenland 3 Apache 4 Navaho 5 Koskimo Woman, Vancouver
6 Cheyenne 7 Mandan 8 Ute 9 Blackfoot 10 Woman Moki Chief
11 Nez Perce 12 Wichita Woman

NATIVES OF SOUTH AMERICA

1 Guatuso 2 Talamanoan Woman 3 Bolivian Indian 4 Guaykuru 5 Caraja 6 Matako
7 Brazilian Indian 8 Guayaqui 9 Araucanian (Chile) 10 Tierra del Fuegan
11 Patagonian 12 Botocudo Woman

HUMAN HABITATIONS

1—Eskimo Circular Snow Hut. 2—Gipsy Hut, Croatia, Hungary. 3—Hut in Brazil. 4—Pioneer Log Cabin.
5—Home in Sumatra. 6—Congo Hut, made of leaves. 7—Indian Tepees. 8—Porto Rican Hut.
9—Floating Village, Congo, Africa. 10—Southern Mansion, United States.

WATER TRANSPORTATION—DEVELOPMENT OF MERCANTILE MARINE

1—Fijian Boat. 2—Spanish Caravel Santa Maria: Flag Ship of Christopher Columbus. 3—Indian Canoe. 4—"Savannah," the First Steamship to Cross the Atlantic, 1819. The paddle-wheels could be unshipped when the wind was fair. 5—The Clermont, the First Steamboat, invention of Robert Fulton, 1807. 6—Ship in Full Sail. 7—Chinese Junk. 8—Cunard Liner "Mauretania" 9—A Modern Yacht.

NORTH AMERICAN ANIMALS

1—Raccoon. 2—Porcupine. 3—Rocky Mountain Sheep. 4 Mountain Goat. 5—Antelope. 6—Bison. 7—Prairie Dog. 8 Grizzly Bear. 9—Skunk.
10—Bald Eagle. 11—Mocking Bird. 12—Blue Bird. 13 Kolibri. 14—Wild Turkey. 15—Prairie Chicken
18—Horned Toad. 20—Axolote, Mexican Salamander.

IN THE NEW YORK SUBWAY

A CLOSE-UP VIEW OF NEW YORK'S SKY-LINE

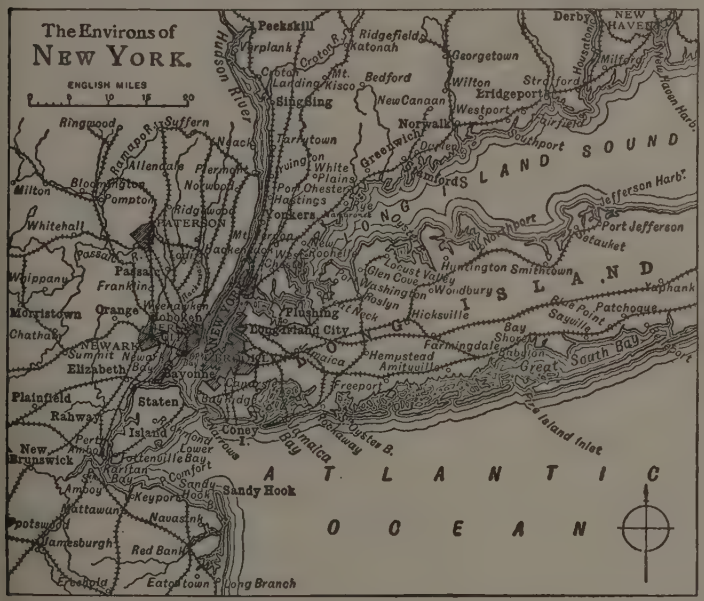
Courtesy U. S. Army Air Service

This is Battery Park, New York City, taken from the harbor. It is the view one gets from a passenger steamer as it sails into port. The Statue of Liberty could be seen plainly if you were standing in this park and looking out over the [illegible]. The low, round building in the foreground is the aquarium, in which thousands of fishes can be seen in their [illegible] in the background to the left. Back of the Aquarium is Wall Street.

unoccupied portions, New York's resident population averages 60,000 to the square mile. In the lower East Side, below 14th Street and east of Broadway, is to be found the most densely populated spot in the world. Population, 6,300,000.

To the nonresident New York City seems a hopeless confusion. The mountain-like ridges of skyscrapers at the lower end of Manhattan dominate a scene that has not its match for impressiveness of wealth, power and human achievement anywhere in the modern or the ancient world. Its tangle of waterways is arched high with bridges, tunnelled under with subways, swarming with shipping and woven by flying shuttles of ferry-boats. Its islands and bordering mainlands bristle for miles with docks and slips. Farther than the eye can see, in every direction, stretch endless streets of tall, crowded buildings, filled with processions of millions of restless human beings.

All its confusion, however, will fall into lovely order if you erase from mind the works of man and catch your first glimpse of the region as it appeared to the eyes of Henry Hudson, the English navigator in the employ of the Dutch East India Company in 1609. No outlook on Sandy Hook noted his arrival in New York's lower bay. He sailed through the Narrows, the mile-wide strait between Long and Staten Islands that is used to-day by oceangoing steamers. In the middle of the 12 square miles of the upper bay is Bedloe's Island, where now Bartholdi's statue of Liberty holds her torch 305 feet in the air. Farther in is Ellis Island, where emigrants are now landed. Lying to the right is Governor's Island, now headquarters of the military department of the Atlantic. At the northern end of the bay, exactly opposite The Narrows, its length forming the eastern bank of Hudson River, Manhattan Island occupies the center of the stage.



In 1609 it was a wild and beautiful spot, the lower end covered with forests and sloping pasture. A clearly defined ridge extends up its center along the line followed by Broadway to-day, rising to rocky hills known later as Harlem Heights, Mount Morris and Murray Hill. In the northeast are marshy plains known now as Harlem Flats. The entire island is underlaid with rock, sometimes a hundred feet below the surface, that supports the weight of the city to-day. Hudson would not recognize the island now, for its hills, which rose 250 feet in the north, have been cut down and graded and built over with residences of moderate height, while ridges, ranges and peaks of skyscrapers, with ravine and canyon-like streets between, have risen from 300 to 800 feet in the lower end.

Land at Battery Park where the Dutch built a warehouse fort in 1623. All the shores around the harbor may be seen from this point. To the west, beyond the Hudson, lies the Jersey shore, covered by Jersey City and Hoboken. To the northeast, over the Harlem, lies the mainland of New York state; and to the southeast is Long Island with Brooklyn. East River, which separates Manhattan from Long Island, is not a river but a strait connecting upper New York Bay with Long Island Sound. It is long and winding, a mile wide at its narrowest point, and contains three large islands — Ward's, Randall's and Blackwell's — that are occupied chiefly by the city's institutions and prisons. Brooklyn Navy-Yard occupies ¼ of a mile of the Long Island shore of East River. Since the blowing up

which declared that any state can make null and void unconstitutional laws of congress. Calhoun resigned before the close of his term, and was elected to the United States senate. He was secretary of state for a short time under President Tyler, and negotiated the so-called Tyler treaty for the annexation of Texas. He returned to the senate, where he remained until his death at Washington, March 31, 1850. Calhoun was one of the foremost of American debaters. He, Webster and Clay were called The Great Trio. His debate with Webster in 1833 on the nature of federal government was one of the most noted for eloquence and ability in the annals of any country.

Cal'ico, a white cotton cloth, received its name from Calicut, a seaport on the west coast of India, whence it was first imported to Europe. The word calico has come to be used to include colored cotton cloths, which are not sufficiently fine to be classed with muslins. Calico-printing or the art of printing colored patterns upon cloth is a process not limited to cotton cloths. It is applied also to woolen, worsted, silk and linen fabrics. This process was known in Egypt in the first century; and in India perhaps at an earlier date. Although calico-printing was not practiced in Europe until the 17th century, the chief center of the industry now is Lancaster, England. The older form of calico-printing was by means of wooden blocks pressed upon the cloth by hand. At present engraved cylinders of copper are used, upon which the cloth is made by machinery to revolve rapidly. It is possible to print in several colors from the same cylinder and at the same time. The manufacture of cotton-goods is a rising industry in the south of the United States, where 1,000,000 bales of cotton are now annually woven into cloth.

California. Excepting Texas, California is the largest state in the Union. It extends from the Oregon line on the north to the Mexican boundary on the south, a length of nearly a thousand miles; and from the waters of the Pacific Ocean on the west to the crest line of the Sierra Nevada Mountains on the east, a width of over two hundred miles. It is two and one half times as large as all New England, containing 158,360 square miles.

The population of the entire state in 1920: 3,119,400. The largest city is Los Angeles, with a population of 575,480. San Francisco is close second, having now passed the 500,000 mark. Other chief cities in the order of size are Oakland, San Jose, Sacramento (the state capital), San Diego, Stockton and Fresno.

Surface and Climate. The Coast Range Mountains are a series of parallel ridges running north and south the entire length of the state and distant from the sea forty miles or less. The peaks rise to five thousand feet in altitude. The parallel ranges of the Coast Range and the Sierra Nevada extending lengthwise through the state divide it into long, narrow regions quite different in physical character. The coast regions extend from the sea-board to the Coast Range; the interior is the trough-like depression between the Coast Range and the Sierra Nevada foothills, sometimes called the great valley of California; and the Sierran region embraces the mountain areas along the eastern border.

It is a state of striking contrasts. It contains the highest land in the United States (excluding Alaska) in the summit of Mt. Whitney, 14,500 feet above sea-level; and also the lowest land, in the bottom of Death Valley, some 300 feet below the level of the sea. In the southeastern corner are the vast areas of the Colorado Desert, the hottest and driest region of our country, where there is practically no rainfall, and the thermometer rises to 130° in the shade; and in the opposite or northwestern corner are the dark and dripping forests of Del Norte County, where the rainfall is eighty inches per year. There are alpine climates in the Sierran counties; marine climates in the coast counties; humid climates in the northern counties; arid climates in the eastern counties; semi-tropic climates in the southern counties. There are many thermal belts and local areas of special climatic conditions, as, for instance, Boulder Creek in Santa Cruz County, where the rainfall is eighty or ninety inches, although surrounded by lands where it is only twenty inches or less; and Imperial County, below the level of the sea, where melons and apricots ripen in the open air in May, peaches and grapes in June; and the orchards of Butte County in the northern part of the state, where great orange groves produce abundantly in the latitude of Ohio and New York.

Products and Industries. This variety in surface and climate makes a corresponding variety in the soils, the crops and the activities and occupations of man. Thus, the north coast is devoted to lumbering. Three hundred million feet of lumber per year are made from the splendid redwood trees (*Sequoia Sempervirens*) and shipped to the markets of the world, particularly to the ports of the Pacific Ocean.

The middle coast is devoted to dairying. The cool, even temperature and abundant moisture produce fine pasturage nearly all the year. Swiss, Italian and Portuguese settlers are found in large numbers, and butter and cheese are the staple products.

The southern coast is a vast summer resort. The soft, luxurious climate, the sea-bathing, the picturesque scenery, the fruits and flowers form attractions that draw countless thousands of people from all parts of the United States and from foreign coun-

YOSEMITE VALLEY, CALIFORNIA

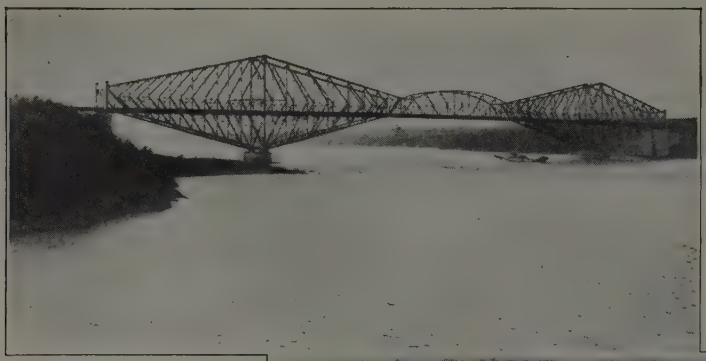
This valley, one of the world's most remarkable scenic wonders, lies on the western side of the Sierra Nevada, about 150 miles from San Francisco.

Courtesy U. S. Army Air Service.

NAR WIDFORSS

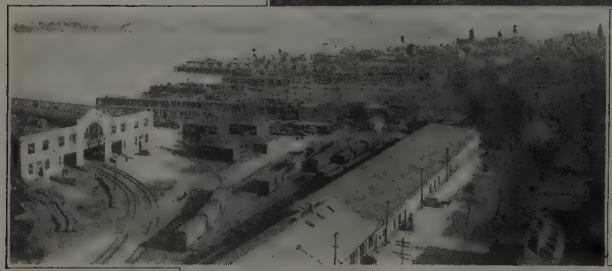
HALF DOME IN WINTER, YOSEMITE NATIONAL PARK

use this peak looks like a dome that some Giant might have broken with his sledge. it is known as Half Dome. In the summer, the ground on the river's edge is covered with beautiful flowers. "Perhaps nowhere else on earth is there so remarkable a combination of beauty and sublimity."



The span of this cantilever bridge across the St. Lawrence at Quebec is the longest of its kind in the world.

A close-up of the stockyards at Winnipeg—great prairie metropolis.



View of the constantly expanding port facilities of Halifax, a city fast becoming an important steel and maritime trade center.

Montreal Harbor; ocean vessels dock here constantly at this great inland harbor of the St. Lawrence.

©Ewing Gallo

CANADIAN GEOGRAPHY

CANADA is a wonderful country. It is not too much to say that it is another Europe at the beginning of its development. Of the interest in Canada on the part of the people of the United States, the heavy immigration in recent years is sufficient evidence. Hence the great practical value of the full treatment of its resources, manufactures, literature, educational facilities and political history, given in the Student's.

ARTICLES ON CANADIAN RESOURCES, MANUFACTURING INTERESTS AND OPPORTUNITIES

The article on Canada gives a broad view of the entire dominion and its great future, including valuable information with regard to its agricultural interests, forests, copper, silver, gold, nickel, cobalt, iron, coal, asbestos, water power, political history, etc. In addition to this treatment of Canada as a whole, there are the following articles on the provinces:

YUKON, NORTH-WEST TERRITORIES, BRITISH COLUMBIA, ALBERTA, SASKATCHEWAN, MANITOBA, ONTARIO, QUEBEC, NEW BRUNSWICK, NEW FOUNDLAND, NOVA SCOTIA, PRINCE EDWARD ISLAND, LABRADOR, AND THE FORMER PROVINCES McKENZIE, UNGAVA AND FRANKLIN.

Articles on products and industries for which Canada is noted: Herring, Cod, Mackerel, Salmon, Gold, Cobalt, Iron, Wheat.

Special articles on Canada's Railway Systems—The Canadian Northern, The Canadian Pacific, The Grand Trunk Pacific.

ARTICLES ON BORDERING AND INTERNAL WATERS OF CANADA

Hudson Bay, Baffin Bay, Lakes Superior, Erie, Huron, Ontario, and the Gulf of St. Lawrence. Why Lake Ontario seldom freezes. Lake Superior and its fantastic pictured rocks.

ARTICLES ON CANADIAN RIVERS

The Athabasca, the McKenzie, the Yukon, the St. Lawrence—th world's most picturesque river; the beautiful Saguenay; the great Saskatchewan; the Niagara (besides articles on the River and its wonderful Falls there is a special article on the Niagara Falls Power Plant.)

ARTICLES ON CANADIAN ISLANDS

Articles on Canadian Islands include Cape Breton, Queen Charlotte the Thousand Islands and Vancouver Island.

ARTICLES ON CANADIAN CITIES

Calgary, Charlottetown, Cobalt, Edmonton, Halifax, Hamilton, Ottawa, Montreal, Quebec, St. John, the great seaport of New Brunswick, and its "reversible waterfall"; Toronto, seat of one of the world's great Universities; its industrial and commercial life; Victoria, Vancouver, Three Rivers; Winnipeg, which exports more wheat than Duluth and Chicago put together--gateway to Western Canada and its commercial metropolis.

at her own estimate as the British Empire of the Far East.

Physical Features. The situation of the Japanese archipelago of four large and nearly 4,000 small islands, off the eastern coast of temperate Asia, is similar to that of the British Isles off the western coast of Europe. Its area of 175,540 square miles is one-third greater, its population of 85,000,000 one fourth more. Its climate, running from the Tropic of Cancer to 50° north, is one of wider range, while its more varied surface gives it greater extremes of heat and cold in every part. The separation from the mainland, on the crest of a 900 mile-long, crescent-shaped mountain-chain that rises from the bed of the ocean, has deeply imbued an imaginative people with a sense of special creation. This colors their literature and art; their manners and customs and religion, and nourishes a fanatical patriotism. The island empire has an almost uncanny beauty of plain and valley; guarded by wooded ridges, watered by cascades, overlooked by the sacred, snowy peak of Fujiyama, flooded annually by rains and warmed by genial suns that awake myriads of flowers and butterflies, and girded by wide defensive seas.

Vegetable and Animal Life. The natural growth varies from palms and bamboos of southern valleys to the oaks and pines of the mountains of Yezo; the crops, from the camphor-gum of Formosa to semitropical tea and rice and mulberry groves for the silkworm; to tobacco, wheat and barley; and up to the wild grasses and reindeer-moss of Sakhalin. Of native wild animals there are foxes and wolves, boars and black bears, none of them numerous. But of birds there are the species common to the continent beside millions of waterfowl, heron and crane and gulls, ducks and geese and reedbirds that make any bit of coast look like the panel of a painted Japanese screen.

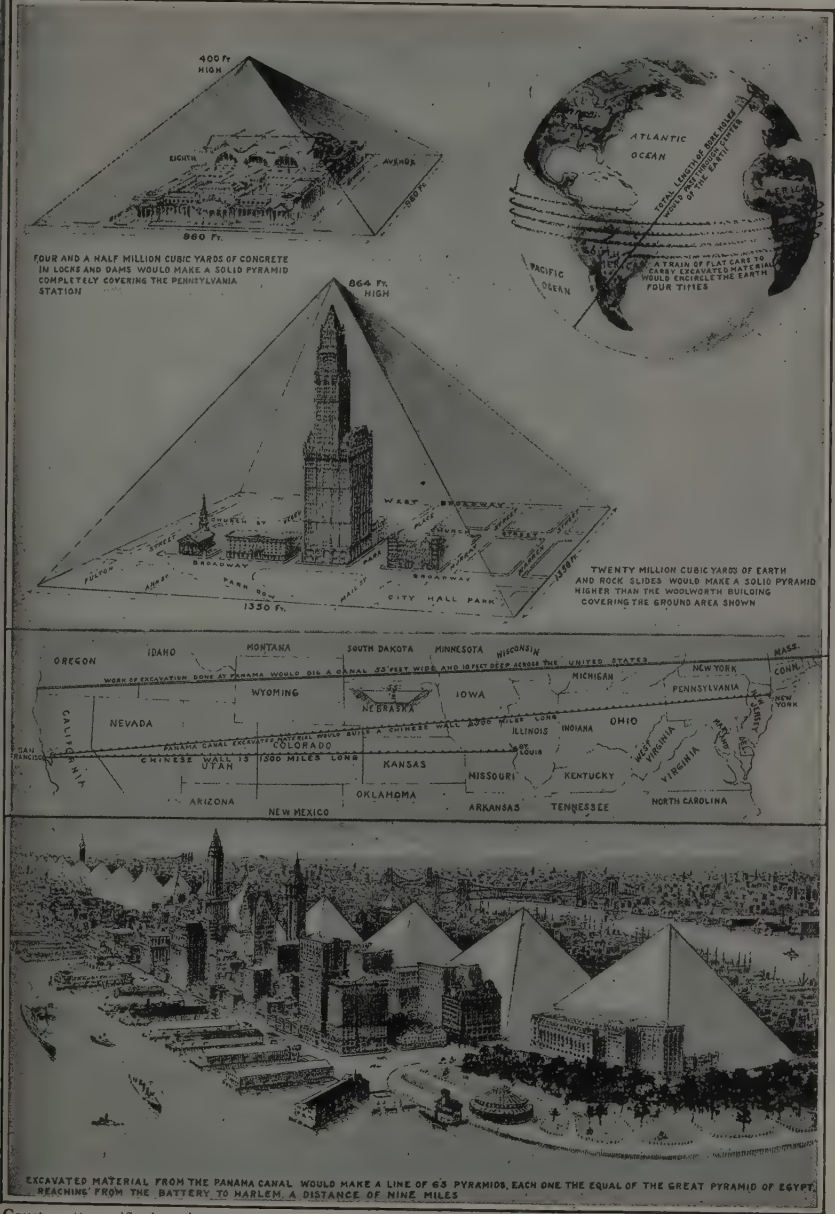
Minerals. The sterile, rocky ridges are underlaid with iron, worked for ages into swords for the *samurai*, and with coal dug out since the awakening, for warship, locomotive and factory. There are some gold and silver and copper, a great deal of sulphur and graphite and ancient beds of kaolin that centuries of porcelainmaking have failed to exhaust. Yet Japan is a poor country in proportion to the population she must support. A large percentage of her area is infertile. History, however, proves that countries, like individuals, usually prosper in inverse ratio to their natural wealth. Like Great Britain, Japan is being forced by necessity into manufacturing and trade and immigration, to take toll of the world.

People and Customs. The philosophical students of history look for analogies. To them it is an equally striking fact that the Japanese, like the English and the people of the United States, are a mixed race, for the mixed races have been the conquerors. The Japanese are an amalgamation of Mongols, Tartars, Koreans and Malays with the aboriginal Ainu, of whom 12,000 still survive, making a race superior to any other yellow people. Their stature is that of southern Europe; their complexion lighter and clearer than the Chinese, their eyes less oblique; their extremities more delicately fashioned. In youth their cheeks are rosy. Their teeth are even and white, their hair fine, abundant and coal-black. It is almost superfluous to speak of the exquisite courtesy and cheerful demeanor of the Japanese, of their personal cleanliness, of the phenomenal good temper of the children. A Japanese baby is said never to cry, not because of an Indian stoicism, but from sheer happiness and well-being. Japan is the children's paradise, where a harsh word is never spoken, obedience never refused.

European dress and habits of living have made little headway. They have been adopted in the imperial court, in the army and navy and at the university and colleges, but 95 per cent of the men still cling to their long robes, girdled with brocade, their loose jackets and wooden-soled pattens. The jinriksha boys run bare-legged in the streets; the farm-laborers wear knee-breeches of blue or white cotton and bamboo umbrella-hats; the women and children their wide-sleeved kimonos and gorgeous silk obis, tied into huge butterfly-bows in the back. The architecture peculiar to the land is likely to be retained, for it is the offspring of the earthquake — light, flat, elastic — bamboo, dove-tailed woodwork and paper-screens are not easily shaken down. Even the temples palaces and tea-houses are of these materials, richly gilded and painted and anchored by heavy, overhanging roofs. The floors are covered with thick, padded straw-mats and divided into temporary rooms by sliding screens. There is little furniture except tables and trays of bamboo and lacquered wood. The ornaments are inscribed rolls of silk, embroideries, art potteries, cloisonné enamels on brass and gold-lacquer art-objects, brought out a piece at a time for admiration. The land wears a holiday air, as of a summer show, clean, gay, fragile. Even the charcoal braziers used for cooking and heating the bath seem like devices for picnic use. The frequent fires are not a great calamity, for the buildings are quickly and cheaply replaced.

The holiday aspect of Japan is increased by the semipublic outdoor life of the people and by the profusion of tiny gardens. The rice and fish that form the staple food are easily cooked, as well in an arbor as in a house, and tea is brewed anywhere. Fruits, nuts, seaweed, beef, beans, poultry eggs, wheat-bread and confections are used by the wealthy and the introduction of

A TRIP THROUGH THE PANAMA CANAL

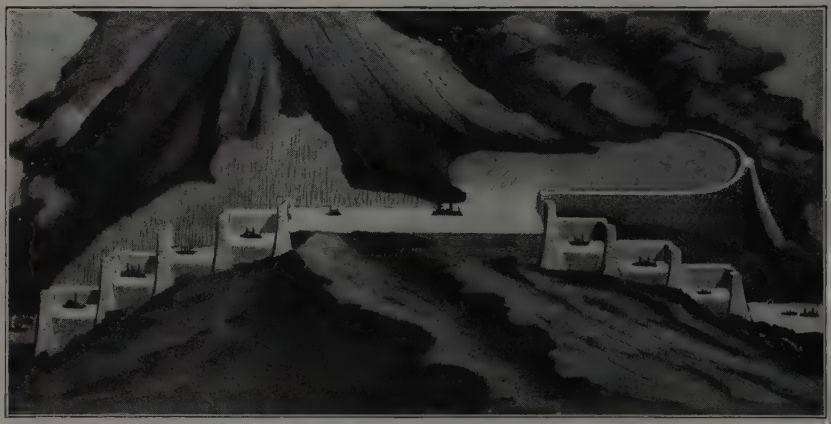


Courtesy Scientific American.

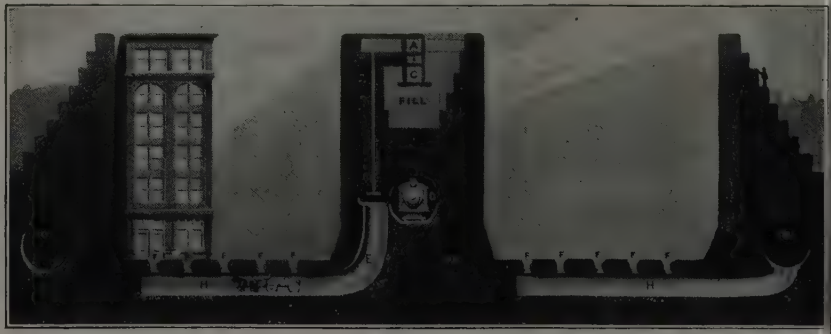
(C) Munn & Co.

The artist here helps us to realize what a prodigious work of engineering it was to cut the "big ditch" across the Isthmus. The Pennsylvania Station and the Woolworth Building are in New York City. The picture at the bottom gives you an idea of what Manhattan Island would look like if the material from the Panama Canal were built into pyramids from the Battery to Harlem.

Notice how the "East" end of the Canal may be said to be west of the "West" end. Although connecting our East and West coasts, the Canal runs Northwest and Southeast.



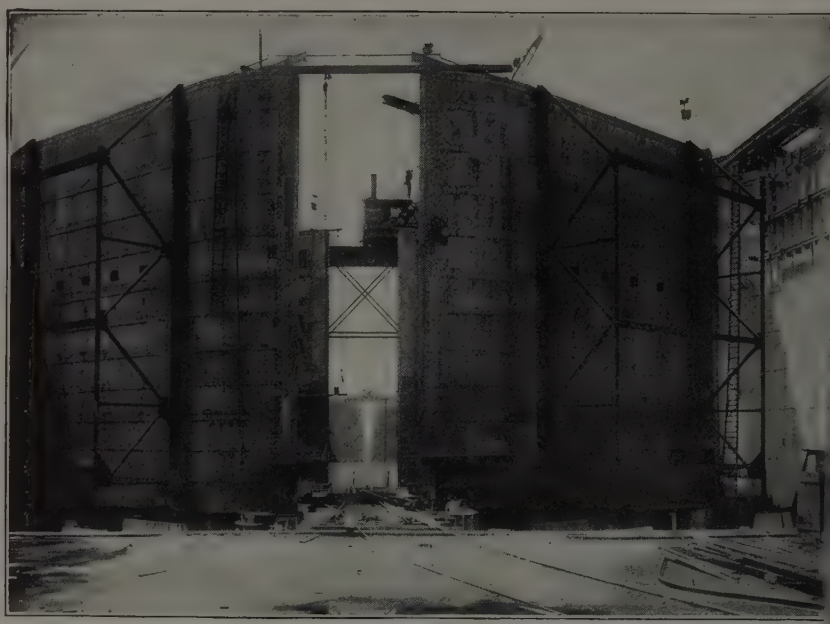
Here are the ocean liners climbing over the mountains by the water stairway. Actual distances not represented. (Hauling system on next page.)



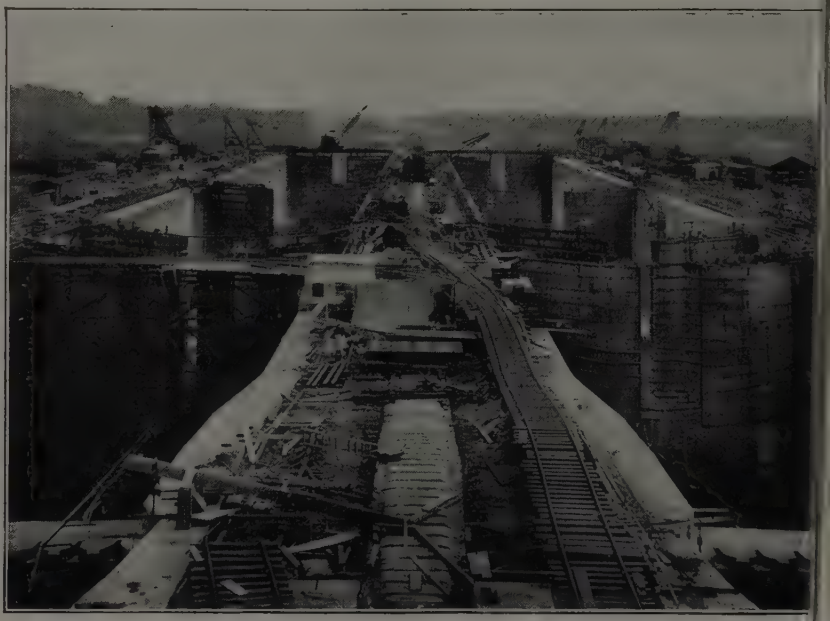
Vessels are raised or lowered by letting water into or out of each lock from the lock above through culverts D G by means of lateral culverts E H, through wells F. (A) passageway for operators, (B) gallery for electric wires, (C) drainage gallery. The locomotive, the team, and the building show the size of a lock.

Courtesy Scientific American. (C) Munn & Co.

We are looking at the Gatun locks, dam and spillway. Notice the locomotives hauling the ships. The two in the rear are for keeping the vessel steady.



Here we are inside a lock during construction. This inward slant of the great entranc gate helps it to better resist the water pressure.



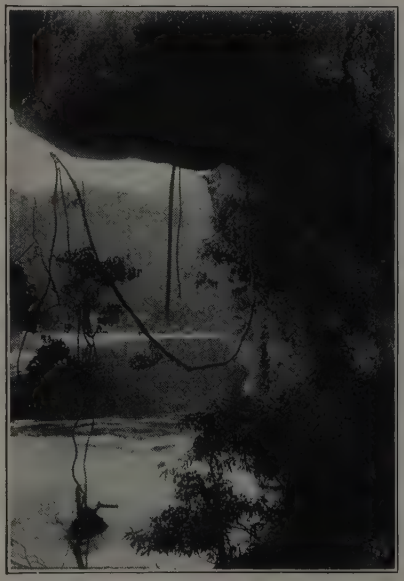
Standing on the railroad track we see the gates which divide the lock into smal chambers for handling smaller vessels.

We are looking down "Bottle Alley" (Colon) before the Americans began "house-cleaning." These pools bred the malaria-infected mosquito.

Can you recognize it? This is the same "Bottle Alley" nine months later. It shows what proper draining and paving methods have done.

This dredge is cutting mud out of the Chagres bottom and pumping it, through a pipe line, into a mosquito-infested swamp—two good jobs at one operation.

This is a part of the history of the Canal—French excavating machinery abandoned in 1888. Picture taken in June, 1911.



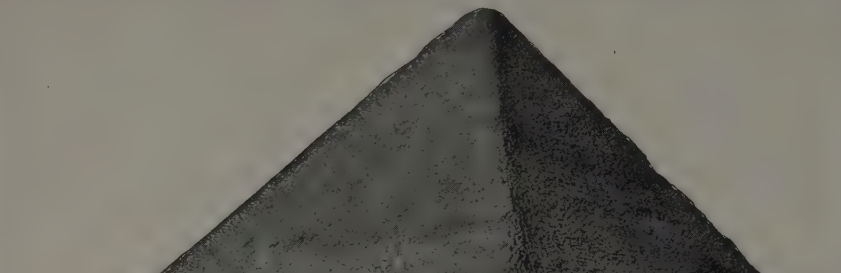
Here we have two views of the Chagres River—near Fort San Lorenzo on the righ and near Los Hornos on the left. Notice how floods have worn the limestone.

A SPHINX RIDDLE SOLVED

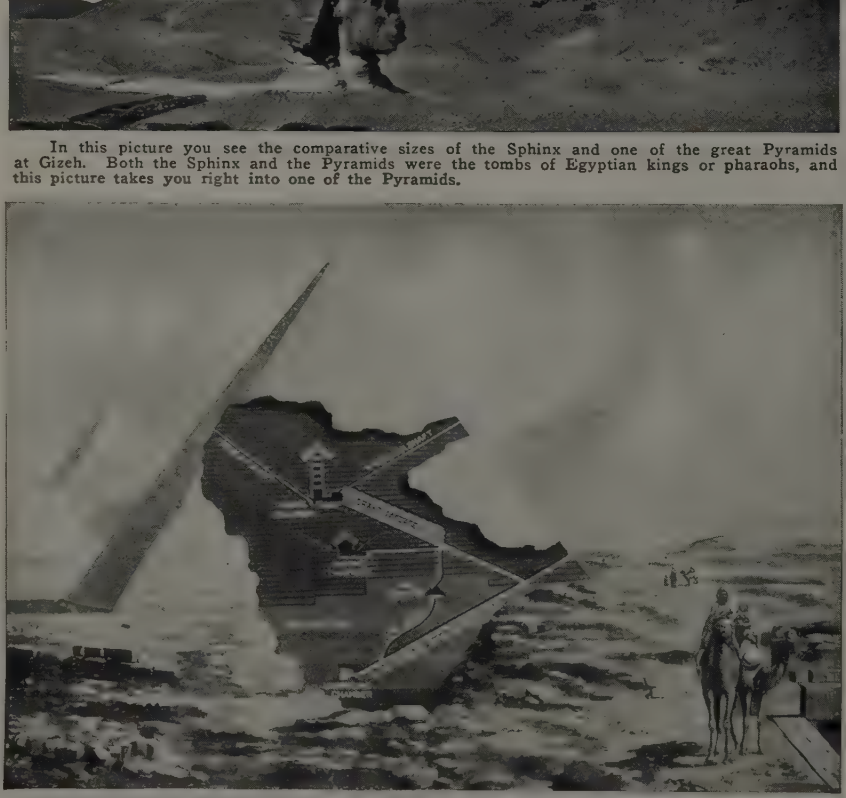
The first of a connected Series of Temples (dedicated to the Sun) in the head & body of the Sphinx.
14 ft. wide by 60 ft. Long.
PYRAMID OF KHAFRA
The Main Temple filling the body of the Sphinx is connected by tunnels with other temples & tombs in various directions
Hollow Pyramid Supposed to contain the tomb of Menes The first historical Pharaoh of Upper & Lower Egypt
TEMPLE between the forepaws of the Sphinx

You have heard the story about the Sphinx that used to ask a certain riddle and then eat up the people who couldn't answer it. It seems the Sphinx had still another mystery in his head that he never said a word about—the temples shown in the picture. These temples were discovered by Professor G. A. Reisner, of Harvard. The Sphinx, being dedicated to the Sun, faces the East, and in his body and in his head are the temples here shown. The main temple is in the body with passages leading in various directions to other temples. The small one right in the top of his head was the holy of holies, and Prof. Reisner reached it first by digging a hole in the top of the Sphinx's head with the help of Egyptians. It was hard to get them to work for him, because they were very superstitious and didn't like to think what might happen to them if they ventured into these sacred chambers.

THE PYRAMID TOMBS OF THE PHARAOHS



In this picture you see the comparative sizes of the Sphinx and one of the great Pyramids at Gizeh. Both the Sphinx and the Pyramids were the tombs of Egyptian kings or pharaohs, and this picture takes you right into one of the Pyramids.



The bodies of the Egyptians were not only preserved in the form of mummies, but the mummies of the kings were hidden away at the end of secret passages, as you see here, so that no one would be likely to disturb them and steal the jewelry and other valuables buried with them. The connection between the blind passage and the one marked "grand passage" was closed with several great stones so arranged that when one was taken out, another would drop into its place and close up this secret passage. After the remains had been laid away and these stones put in place, the attendants went down the passage, marked "The Well," to the blind passage, and so to the outer world again.

AGRICULTURE

The study of Agriculture holds a place of large and growing importance, both in our schools and in the work of the successful farmer of today. This outline shows the abundant material contained in THE NEW STUDENT'S REFERENCE WORK, in aid of this study. For the convenience of those who wish further information in any special line, reference is given to Farmers' Bulletins, issued by the government. These Bulletins are sent free to any one who applies for them. Address, Secretary of Agriculture, Washington, D. C.

1. STUDY OF THE SOIL:

a. **Clay soil:** in which the earth particles are very small and hold together 1778; 406.
b. **Sandy soil:** in which the particles are larger and loosely held together 1673.
c. **Loam:** a mixture of sand and clay 1778.
d. **Alluvium:** soil formed by rivers, bottom land 53.
e. **Humus:** decayed organic matter in the soil 898; 1165.
f. **Earthworms:** how they make humus in the soil 575.
g. **Mulch:** a loose top dressing to prevent loss of moisture 331; 1275.
h. **Capillarity in soils:** rising of water through the soil particles 330.
i. **Subsoil:** uncultivated soil below the upper layer 1842.
j. **Dry farming:** method of farming with little rainfall 942.
k. **Transpiration:** amount of water needed by plants 1936.

Consult:

Farmers' Bulletin No. 257 Soil Fertility.
Farmers' Bulletin No. 266 Management of Soils to Conserve Moisture.
Farmers' Bulletin No. 245 Renovating Wornout Soils.
Farmers' Bulletin No. 150 Clearing New Land.

2. FERTILIZING THE SOIL:

a. **Nitrogen:** plant food consumed mostly in growing 1353.
b. **Phosphate:** plant food consumed mostly in fruiting 1475.
c. **Potash:** plant food consumed mostly in seeding and maturing 1537; Ammonia 64; Saltpeter 1667.
d. **Lime:** used for correcting the acidity of soils 1071; 658; Marl 1173.
e. **Manure:** used for getting plant food and humus into the soil 1165.
f. **Fertilizers:** plant foods artificially and commercially prepared 657.
g. **Benefit of live stock on the farm:** 1828.
h. **Compost and green manures:** Cowpeas 470; Pea 1432; Alfalfa 46; Rice 1610.
i. **Nitrogen gathering crops:** 1353; Bacteria 154.
j. **Root tubercles or leguminous plants:** 1633.
k. **Absorption:** why plant food should be soluble in water 5.
l. **Rotation of crops:** benefits of rotation 1636.

Consult:

Farmers' Bulletin No. 44 Commercial Fertilizers.
Farmers' Bulletin No. 192 Barnyard Manure.
Farmers' Bulletin No. 278 Leguminous Crops for Green Manuring.
Farmers' Bulletin No. 48 The Manuring of Cotton.
Farmers' Bulletin No. 77 Liming of Soils.
Farmers' Bulletin No. 88 Alkali Land.

Plan for Finding What Plant Food Element Is Lacking in the Soil.

Lay off 9 plats in a field, 2 rods by 8 rods. Apply a different fertilizer to each plat. Plant corn in each one, and compare the growth and yield of the plats. A more liberal application of fertilizers is used in making this test than would be recommended for general fertilizing.

A chemical analysis of a soil will give valuable information of a general nature regarding the soil; but it cannot be relied upon to determine just what fertilizers should be used. The only way to find out what fertilizers to use on a particular piece of ground is by actual experiment.

What is dry farming? 331.
What is a good crop on soil too poor for clover? 470.
How many creameries are there in this country? 475.
How are creameries conducted? 475.
What advantage has the separator? 475.
What are the two classes of feeding stuffs? 651.
What are the forage crops? 652.
How do cattle get the bloat? 652.
What three fertilizers are in use? 657.
What parts of a plant need nitrogen? 657.
What does potash produce? 657.
What gives general plant vigor? 657.
Why does a wise farmer mix his own fertilizers? 658.
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How do plants and animals make soil? 1778.
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What is green crop manure? 1165.
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FRIENDS AND FOES OF AGRICULTURE.

What large proportion of crops are destroyed by insects? 929.
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How do plant lice suck the juices of the plants? 82
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1—Blossom. 2—Fruit. 3—Fruit; shell split. 4—Seed. 5—Olive Fruit. 6—Blossom. 7—Fruit; cut lengthwise. 8—Seed. 9—Blossom. 10—Blossom; cut lengthwise. 11—Fruit. 12—Branch of Blossoms. 13—Blossom of Female Tree. 14—Fruit. 15—Fruit; cut in half. 16—Branch of Oil Palm Fruit. 17—Branch of Male Flowers. 18—Single Fruit. 19—Single Male Flower. 20—Single Female Flower.

Coffee Branch, showing Fruit and Blossom. 2—Single Blossom. 3—Fruit. 4—Cut Fruit. 5—Tea Branch showing Blossoms. 6—Fruit. 7—Cocoa Branch, showing Fruit. 8—Opened Fruit. 9—Blossom. 10—Hops, Male Plant. 11—Male Blossom. 12—Female Plant. 13—Fruit. 14—Minute Grains (greatly enlarged) at base of petals. 15—Catkin of Female Flower. 16—Tobacco Plant. 17—Flower. 18—Fruit.

OME OF THE PLANT WIZARD'S WORK

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POTATO CAUSED TO GROW ON TOMATO VINE

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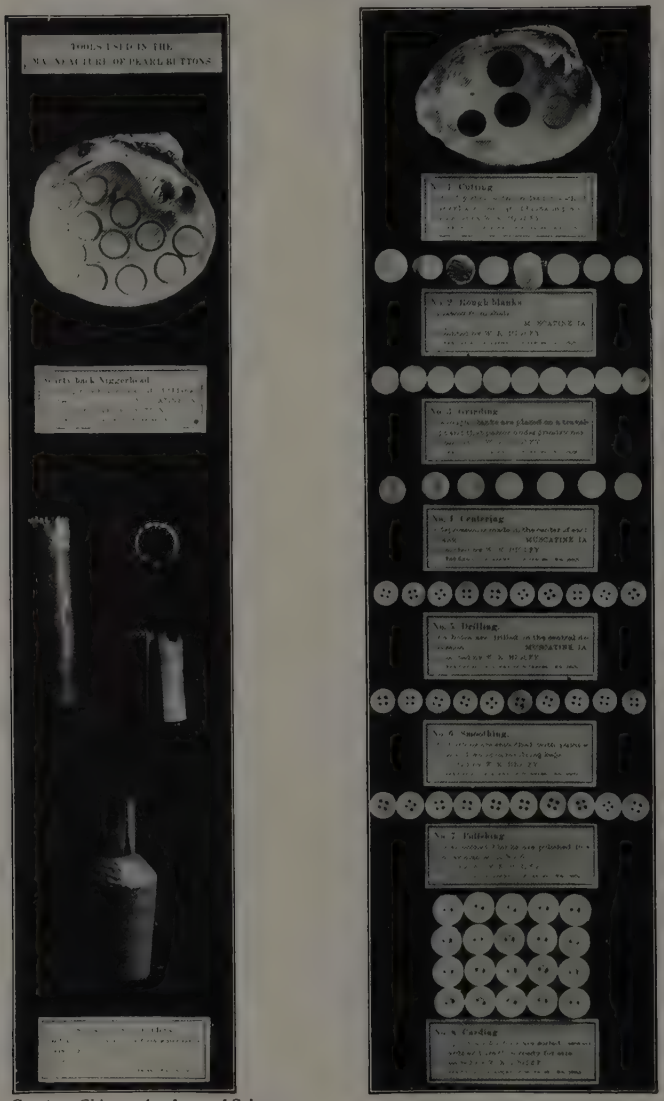
THESE WILD POTATOES ARE CROSSED WITH TAME POTATOES TO MAKE THEM HARDY

PEANUT

A—Plant with Root, Blossom and underground Nuts. 1—Blossom cut lengthwise. 2 -Ripe Nut
3—Nut cut lengthwise. 4—Seed 5 and 6—Germ

HOW CLAMS HELP MAKE "PEARL" BUTTONS



Courtesy Chicago Academy of Sciences

What are known as "pearl" buttons are made from the pretty inside lining of clam shells. These pictures show just how it is done. After the rough disks, called "blanks," are cut from the shell they are fastened on a traveling band that carries them under grindstones which smooth them and make shallow pits in the center. Then, in these pits the holes are drilled. Next the buttons are put into revolving kegs, containing pumice stone and water, in which they tumble about and are thus further smoothed and polished. Now the buttons are ready for the sewing—first of all on cards and then on that pretty new dress!

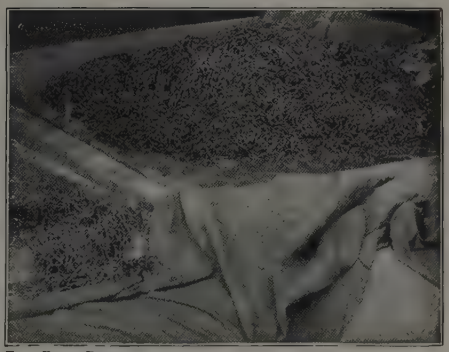
TEA PLANT. This picture of the tea plant shows the leaf, blossom and seed pods. The bush often shows blossoms and seed at the same time. If left to nature, the tea plant will grow to a height of twenty feet, but as cultivated it is kept down to from two to five feet by constant pruning. The average tea tree lives for fifty years, though it is said that there are records in China of trees living three hundred years.

From Brown Bros.

PICKING TEA IN CEYLON. Here the Tamil coolies are seen at work under the watchful eye of the task-master. The tea baskets hold about fourteen pounds and the average is three baskets per coolie per day. The picking begins about the end of April and usually lasts until the end of November. Only the tip of the shoot and soft leaves are picked.

From Brown Bros.

TEA ROLLER. After the tea is picked it is spread out on trays or racks and left to wither from eighteen to twenty hours. It is then taken to the roller, which we see in this picture. The object of rolling is to squeeze out the moisture left after withering, and to give the leaves a good twist.



From Brown Bros.

FERMENTING. The next process is fermenting The leaf is spread on the floor of a cool room, covered with wet cloths and allowed to ferment until it turns to a bright copper tint. This is when black tea is wanted If green tea is desired, the leaves are not fermented. Green tea and black tea may come from the same tree; the difference is due to the manner of treatment after picking.

FIRING. After fermentation the leaf is spread on wire trays and pushed into this machine which we see in the picture, where a current of hot air from 210° to 220° Fahr. is passed through it The tea comes out dry and brittle and of a black color.

Copyright by B. L. Singley

SELECTING TEA LEAVES. After the tea ha been sifted and separated into grades, the tea tha is intended for exportation is spread out on a tabl and gone over once more, usually by girls wh divide the leaves, the larger from the smaller, an pick out all objectionable bits that remain.

From Brown Bros.

SIFTING. After firing the tea is run through the sifting machine which sorts it into various gra known in the market as Broken Orange Pekoe, Orange Pekoe, Pekoe Souchong, Fannings and Dust. T picture shows a sifting machine and different grades of tea spread on trays.

standard designs to cover the different types required were adopted and the steel sections were made according to these designs and punched at bridge-building plants scattered all over the country. Then these parts were sent to the ship building yards where they were quickly put together because the shaping of the sections and the punching of the holes was done with almost absolute accuracy. It was to the skill developed in the building of bridges in our land of many rivers that this brilliantly simple idea was due. Both ships and steel bridges are made somewhat like ladies' gowns. That is to say the parts are cut out of steel plates following the pattern of a light wooden frame called a template which corresponds to the paper pattern used by the dressmaker. Experts, working in what is called a "mold-loft," lay out the paper patterns for the ship much as men in a ready-to-wear clothing shop chalk out the parts of garments on the cloth. The mold-loft is a "light-flooded" room large enough for laying out the entire ship in the exact size on the floor. The templates are made from these patterns and sent to the bridge plants.

This method was applied both to the building of war vessels and merchant ships with the result that while, previous to the war, the United States had no international merchant marine worthy of the name, by the fall of 1918 the American Flag was carried on ships with a tonnage of 7,000,000.

As regards material, the advantage of steel and iron over wood is, first, in *weight;* iron saves 30 to 40% in weight compared with wood, and steel nearly 15% compared with iron. Second, as regards safety, steel-ships are far safer than iron or wooden ships, largely because injuries from collisions etc. do not spread so extensively. As regards convenience in manufacture, steel is easier to work when cold than iron, and can be cast or rolled in larger sizes, for many parts of the ship. Both these materials enable a machine to manufacture and substitute *one* piece in many portions of the ship, where, in a wooden vessel, the carpenter must carefully fit together many pieces. The single disadvantage of the metal ship is its greater tendency to become covered with sea weed etc.— that is, to "foul." In consequence it must resort much more often to the docks for cleaning.

Shipbuilding once was a trade and an art. It now is an *industry* in which many trades are combined, from boiler-making to electric-wiring and from the calculation of the strains to which the several parts will be submitted to the decoration of the splendid furniture of the finished ocean-liner. Again, it is a *science* rather than an art, inasmuch as the builder is guided, not so much by the image and the actual sight of the ship, as by a system of rules and by pages of calculations.

The best ships are built double-bottomed. The keel is laid, and then the bottom is built of a number of cells or steel-boxes. One or more longitudinal bulkheads run the length of the ship. Steel frames take the place of the old wooden ribs, and are so shaped as to connect readily with the other parts of the ship. Plates of the required sizes and shapes are then brought, riveted and calked. The rivets are brought red-hot, placed through holes bored in the plates, and then hammered out so as to stay. As they cool, their grip fastens. Calking is done by hammering a chisel-shaped tool against one plate where it overlaps the next one. The great length of our modern ships is made possible by a truss-construction, not unlike that employed in many steel-bridges. The best ships are divided into many watertight compartments, such that two or more may be filled without causing the ship to sink. These compartments naturally add still more to the strength of the ship. It is common to use the double-bottom to admit water as ballast, where the ship has a light cargo. In simpler ships the frame or rib joins directly to the keel.

Vessels are usually launched when the hull is sufficiently advanced to assure its floating, so as to diminish the weight to be handled in launching. A cradle is commonly built around the ship, which is of wood, and rests on smooth, wooden "ways" which are lubricated with soap etc. These support the vessel beneath and at the sides. The keel rests on blocks, which also support the ship out towards the sides. When these blocks are knocked away, the weight of the ship is transferred to the cradle and to the ways. As these have a slope of about five eighths of an inch to a foot and are well-greased, the ship has only to be released from restraint to start with increasing velocity towards the water. It is at the moment when the restraints have been removed, after the blocks have been knocked away that the ceremony of "christening" the ship commonly takes place. Once the vessel is afloat, the machinery and, if it is a warship, the armament are put in, and the furnishings of the ship are completed. In the case of a modern ocean-liner the rooms are decorated as in the richest hotels.

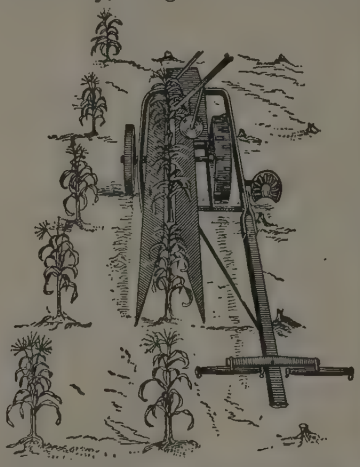
Many enormous cargo-ships have been built, of which *The Oceanic* of 28,000 tons is an example. These ships have steam or electrical hoisting-engines on their decks, and the masts serve as derricks in port and as signal-posts at sea. Sails they never bear. Oil is shipped in tank-steamers, and wheat-ships have special forms of construction to make the unloading and loading easier.

Most large vessels are now built with two and even more screws. This enables the

Corn, Indian, or Maize, the original name of corn or *Zea Mays*, a species of the grass family. Corn is said to have become the most important food-plant, next to rice. It is now almost unanimously conceded that it originated in America and is probably native to Mexico. Corn was found in cultivation by the Indians upon the discovery of America, and has continued to be called Indian corn; in fact the name maize is seldom used in America. Although very numerous varieties have been developed, they are all considered to have been derived from a single species. The commonly used classification is as follows: pod-corns, pop-corns, flint-corns, dent-corns, soft-corns, sweet or sugar-corns, starchy sweet-corns. Sweet corn is distinguished from the ordinary field-varieties by its wrinkled or shiveled kernel and its somewhat translucent appearance. The pop-corn is characterized by the excessive development of the horny region of the endosperm and by the very small size of the kernels and ears. Corn is hardly less a staple food than is rice in tropical countries, while in colder countries it is rapidly becoming popular. It is thought to be more nutritious than barley, buckwheat or rye. It is more generally used in America than in other continents. In the United States the annual crop is over 2,700,000,000 bushels, or about two thirds of all the grains grown. When coarsely ground, corn forms hominy; when finely ground, corn-meal. Pop-corn is a variety whose grains, when roasted, swell and burst, turning inside out. However, the greatest use of corn in America, is as a food for cattle, sheep and hogs. Large quantities of starch are made from corn. This is used for food and for laundry-work, while a good part of it is made into grape-sugar or glucose. The dried leaves and stalks of corn furnish a supply of cattle-fodder. The husks are used for packing and for mattresses; while in South America they are also used for cigarettes. The cobs make popular pipe-bowls for tobacco. Corn was introduced into Europe by Columbus; but there is good ground for believing that the maize plant was known in Asia and Africa before that time.

CORN

Corn-Harvester. Among the many labor-saving machines which have so greatly aided modern agriculture is that known as the corn-harvester. One type of these machines cuts the corn and binds the stalks in bundles ready for shocking. Another type cuts and shocks the corn without binding it into bundles. With the use of one of these machines a single man with a team may easily cut eight or ten acres of corn in a day, doing the work of four to



CUTTING MECHANISM OF CORN-HARVESTER

eight men by former hand-methods. The illustration shows the cutting mechanism of one of these machines. The edges of the side-knives are at an angle to the line of draft, and as the machine advances the knives move with a shear-cut against the corn-stalks, severing them. They are then carried away by a conveyor and bound in bundles.

Corneille (*kôr'nāl'*), **Pierre,** the greatest French tragedian and the founder of French comedy, was born at Rouen, June 6, 1606. His ill-success as a lawyer sent him to Paris in 1629, where his first comedy was produced and acted in two theaters at the same time. In 1636 *The Cid*, his most popular tragedy, took Paris by storm, and in spite of Richelieu, a personal enemy of the author, and in spite also of the Academy, his creature, could not be suppressed; and soon "fine as the Cid" became a common saying. *Le Menteur* showed the author to be great in comedy as well as in tragedy. *Polyeucte* and *Rodogune* are others of his best works; while the finest verses he wrote occur in the central love-scene of *Psyche*. *Horace* and *Cinna* are also favorite productions of Corneille. Strength and sublimity are his chief characteristics.

Corne'lia. See GRACCHI.

Corne'lius, Peter von, one of the first masters of the modern German school of painting, was born at Düsseldorf, Sept. 23, 1783. When but 19 years old,

WORK DONE BY OUR RIVER GIANT

NORTH AMERICA
MISSOURI — MISSISSIPPI 4200 MILES
SOUTH AMERICA
AMAZON 3300 MILES
AFRICA
NILE 3670 MILES
ASIA
OBI 2500 MILES
EUROPE
VOLGA 2200 MILES
TWO FIFTHS OF THE UNITED STATES DRAINS INTO THE MISSOURI-MISSISSIPPI SYSTEM
1,000 Cu. Ft. MISSOURI RIVER WATER MAY CONTAIN A MAXIMUM OF 147 Cu. Ft. OF SAND
WOOLWORTH BUILDING NEW YORK FIFTY FIVE STORIES HIGH
NIAGARA
MISSISSIPPI NORMAL
MISSISSIPPI IN FLOOD EQUALS 8 NIAGARAS
MAXIMUM DISCHARGE 2300,000 Cu. Ft. PER SECOND

Courtesy Scientific American. (C) Munn & Co.

Our giant river system, the Mississippi, is a good farmer in some respects and a very thriftless one in others. The deposits it makes over the land in flood time furnish rich soil for crops, but it is constantly carrying away vast quantities of good farm land and pouring it into the Gulf. Sometimes, as in the spring of 1913, when several hundred people were drowned and thousands of homes swept away in the floods in Ohio and Indiana, it is still more troublesome. How to control this giant of ours, so that all its work will be useful, is one of the great problems which state and federal governments and the engineers are trying to solve. The building of the Panama Canal shows what gigantic tasks can be accomplished by working together along right lines.

L. Borg

Courtesy of the Santa Fe Railway

GRAND CANYON OF ARIZONA

n you stand upon the mountains and look at the Colorado River which made the Grand Cañon, it seems like a narrow ribbon. Beautiful coloring and peculiar rock figures are so interesting you can gaze into the cañon for hours without tiring.

Map-Picture Story of Uncl

If you could visit the United States "all at once," this map tells in a striki

WESTERN STATES

1, Fishing Schooner. 2, Fishing Boat. 3, Salmon Fishing. 4, Apples. 5, Wheat. 6, Copper. 7, Hogs. 8, Sheep. 9, Lumber. 10, Lumber Boat. 11, Grapes. 12, Gold and Silver. 13, Silver. 14, Salt. 15, Cattle, Horses and Sheep. 16, Coal. 17, Alfalfa. 18, Copper. 19, Gold. 20, Peaches. 21, Oil. 22, Oranges. 23, Dates. 24, Vegetables (Irrigated Land). 25, Apples (Irrigated Land). 26, Sheep.

CENTRAL STATES

1, Spring Wheat. 2, Lumber. 3, Mill. 5, Iron. 6, Apples. 7, Potato Butter and Cheese. 10, Cattle. 11, 13, Packing House. 14, Lumber Y Manufacture. 16, Hogs. 17, Oats. 18, 20, Winter Wheat. 21, Lumber. Automobiles. 24, Oil. 25, Tobacco.

Resources and Great Industries

urces and the great industries based upon them would look, and where they are located:

SOUTHERN STATES

Cattle. 2, Sheep. 3, Horses. 4, Oil. 5, Vegetables. umber. 7, Sugar Cane. 8, Steel Mill. 9, Coal. otton. 11, Turpentine. 12, Lumber. 13, Tobacco. Vegetables. 15, Oranges. 16, Pineapples. 17, r Boats. 18, Oyster Boat.

MIDDLE ATLANTIC

1, Cattle. 2, Grain Elevator. 3, Butter. 4, Cattle. 5, Steel Manufacturing. 6, Oil. 7, Coal. 8, Peanuts. 9, Tobacco.

NEW ENGLAND STATES

1, Lumber. 2, Fishing Boat. 3, Oyster Boats. 4, Paper Mill. 5, General Manufacturing. 6, Fishing.

What is meant by the Urim and Thummim? 1992.
Who was the successor of Henry Ward Beecher? 1.
Who was called the Father of the Faithful? 4.
Where and when was the name Christian first given to the disciples of Christ? 80-81.
What did Christianity do for Rome? 1627.
Who introduced Christianity into Scotland and when? 1708.
What title is given to the head of the Greek church? 1429.
From what did the Greek church arise? 1429.
Who were the Dominicans? 543.
Who were the Druids? 554.
When and by whom was the organization of Jesuits formed? 1122.
Who was the founder of the Shakers? 1045.
Who was the founder of the Protestant missions in China? 1266.
What president was instrumental in securing religious liberty to the people of Virginia? 1142.
Where did John Wesley first preach to the colonists? 1683.
When did the Saxons accept Christianity? 1686.
Who was the founder of the Karen mission? 232.
What led to the formation of the American Baptist Missionary Union? 981.
Who was the founder of the first Sunday school? 1848.
What was the beginning of the Swedenborg movement? 1855.
When and by whom was the Society of Quakers formed? 1570.
What led to the formation of the American Board of Missions? 981.
What is the first account of the Greek religion we have? 801.

TRADES AND MANUFACTURES

When was the linen mill first introduced in England? 1077.
Where and when was point lace first known? 1017.
Of what is macaroni made? 1129.
What is linseed oil made from? 1077.
How is indigo produced? 923.
From what are natural gas and petroleum said to be produced? 1306.
Where does port wine come from? 1534.
How is oleomargarine made? 1379.
What is the most important manufactory in Worcester, England? 2109.
How are bottles made? 773.
How is ice manufactured? 911.
How many white lead factories in the United States? 2079.
What is the first gold, lead and silver state? 428.
What is the extent of the sugar beet raising in France? 705.
What is celluloid, and when and where was it invented? 357.
What is the difference between chocolate and cocoa? 418.
When and where was the first rolling-mill established? 939.
What city is the world's greatest milling center? 685.
What class originated the making of whiskey and for what purpose? 2076.
When were shells first used as projectiles? 1738.
When and where was the first printing press used in the United States? 1549.
What staple product of South Carolina is considered the best in the market? 1784.
How early was wire drawing begun in the colonies? 1185.
What port is next to New York in its foreign trade? 249.
Which state stands foremost in manufactures? 1332.
What state yearly ships out about 10,000 carloads of peaches? 516.
What country produces nearly half the steel of the world? 1820.
Why is Milwaukee sometimes called the "Cream City," and what are its chief manufactures? 1229.
How many laborers in this country is it estimated there are whose yearly income does not exceed $475? 1015.
In what city are 20,000,000 steel pens made every week? 219.
Where are the largest starch factories in the world? 1812.

he had no other heir. The three Silesian Wars (1740-42; 1744-45; and 1756-63 — the Seven Years War) ended in securing Silesia to Prussia, except the Austrian province of Silesia, a country south of Prussian Silesia, covering 1,987 square miles, rich in mines and with a population numbering 756,949.

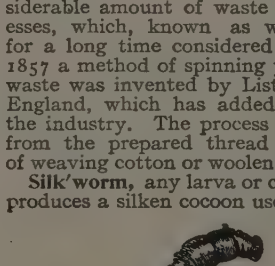
Silica (*sĭl'ĭ-kă*), a compound of silicon and oxygen (SiO_2), is found in the pure state in the form of quartz or rock crystal. Flint, sandstone and chalcedony are nearly pure silica. It occurs also in combination in a large number of abundant minerals which are called silicates, and of which feldspar, mica, hornblende and clay are examples. Silica exists in many plants, particularly the grasses, in the quill-feathers of birds and in sponges. Most animals contain very little of it. Silicon, the nonmetallic element contained in silica, is never found in the free state. Although, next to oxygen, the most abundant element in the earth's crust, it is merely a chemical curiosity, being very difficult to separate from oxygen. Silica is largely used in making glass, and is an important constituent of porcelain, china, bricks etc.

Silicle (*sĭl'ĭ-k'l*), a short silique, the peculiar fruit of the mustard family. See FRUIT.

Silique (*sĭl'ĭk*), the peculiar pod-like fruit of the mustard family, characterized by a false partition which runs lengthwise and divides the pod into two chambers. See FRUIT.

Silk, the cloth and thread manufactured from the fiber obtained mostly from the cocoons of the silkworms. The making of silk probably originated in China, the wife of an emperor being credited with first unwinding a silk cocoon in 2600 B. C. The silkworms' eggs were brought to Constantinople from China about 552 by two Persian monks, who carried them in a hollow cane. They were successful in raising them and in introducing the manufacture of silk. The new industry spread through Greece, was carried into Sicily by prisoners of war, and brought to Spain by the Moors. Louis XI and Francis I imported workmen from Milan into France, and succeeded in starting the silk-manufacture after the cultivation of the mulberry tree for food for the worms had been established in 1564. In England silk-manufacture began under James I, but received a powerful impulse in 1685, when a large number of silk-weavers were driven to England by the Edict of Nantes. James I made an effort to introduce the industry into the American colonies, sending eggs to Virginia and offering rewards for their cultivation, but tobacco was more profitable. It was cultivated in South Carolina and Connecticut before the Revolutionary War. There have been several efforts to make the cultivation of the silkworm more general in the United States, one in California in 1854 and a Woman's Association formed in Philadelphia in 1876, but with no great result. The manufacture of silk is, however, carried on quite extensively, the center of the industry being Paterson, N. J., where there are more than 100 silk-factories. France is the principal silk-making country, the British silk-trade having been much injured by the introduction of French goods free. The process of manufacture takes the raw silk, obtained from the cocoons of the worm, by winding it off through a reeling-machine; cleans, twists and doubles the threads; and winds them on bobbins and reels for the weaver. There is a considerable amount of waste in all the processes, which, known as waste silk, was for a long time considered useless, but in 1857 a method of spinning yarn out of the waste was invented by Lister of Bradford, England, which has added very much to the industry. The process of weaving silk from the prepared thread resembles that of weaving cotton or woolen goods.

Silk'worm, any larva or caterpillar which produces a silken cocoon used in the manufacture of silk. The name applies especially to the famous silkworm (*Bombyx mori*) that feeds on the mulberry tree. All silkworms are the larvæ of moths. The eggs are laid in the number of 200 or 300 by a single individual. On hatching, the caterpillars go through several moults. They eat ravenously save just before moulting, and many die during the change of skin. Silkworms are subject to various diseases, great numbers being attacked by a fatal fungous disease. Constant care must be used in rearing them and strict attention paid to cleanliness, ventilation and temperature. When they reach the fifth stage they eat enormously and attain a length of three or three and one half inches. They now are naked worm-like animals of a pale greenish color. About 36 days or more after hatching, they begin the formation of the cocoon, in which they undergo the transformations that convert them into moths. The cocoons are the source of the silk. They usually are white or yellowish and about an inch or more long and half as broad. The silk comes from a pair of long, tubular glands which open upon the lower lip of the animal. As the material of a spider's thread hardens on contact with the air, so this silk substance is formed into a delicate strand



SILK-WORM, LARVA, CHRYSALIS AND COCOON

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Silk is made from the cocoons of the silk worm, a sort of caterpillar which is hatched from the eggs of a small moth. The picture shows the moth, the eggs which it lays, the larva or worm which is hatched from the eggs of the egg and the cocoon which the silk worm spins. The egg is small and nearly round, looking much like a turnip seed The moths are carefully kept, the eggs are collected and are kept warm until hatched. The worm when hatched is a tiny little thing, covered with long hair, has a shiny nose and sixteen small legs. The worms are fed with chopped mulberry leaves until they are full grown which is about thirty-two days after hatching.

Copyright by B. L. Singley

Orchards of white mulberry trees are grown to supply food for the silk worms. Here we see an orchard in Japan where men are gathering mulberry leaves which will be taken to the rearing-house in which the worms are fed.

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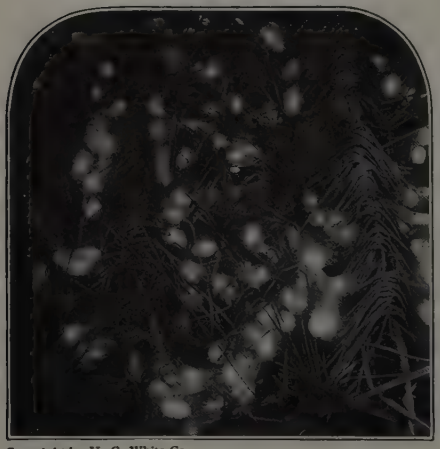
The worms are kept in trays made of matting an these are placed on racks, for convenience and to giv them plenty of air. The mulberry leaves are place beside the worms which eat the tender parts betwee the veins of the leaf. When thousands of worms a eating, they make a sound like a gentle shower of rai Here we see a tray of worms feeding on the leaves.



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When the worms are full grown and ready to spin, they are placed on twigs or coarse straws spread over frames, as we see in this picture. There are two long silk glands running along the sides of the body of the worm which open together on the under lip. The worm spins the cocoon by ejecting from these glands a fluid which hardens immediately, forming a thread of 800 to 1200 yards in length, moving its head around in regular order for about three days.

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The cocoons are brought to market in large baske by the silk farmers. Here they are carefully examin and marketed. In natural order the worm in t cocoon is transformed into a chrysalis and later intc moth, which comes out of the cocoon. This ruins t cocoon for reeling and hence the cocoons which are be used for the manufacture of silk are heated and t chrysalis killed.

yright by Brown Bros.

The cocoons are then sent to the reelers. A few of the cocoons are placed in a basin of hot water, which tens the gum; the outside fibres are removed so that a single thread runs free, just as you would unwind hread from a ball; the ends are collected together through a guide and wound up on the reel, the fibres m the different cocoons making one single thread. This picture shows the old method of reeling by foot chine.

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This picture shows the new style of reeling in Japan, by power machinery.

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The raw silk is taken from the reel and twisted into skeins and placed in bundles. These bundles packed in bales for shipment. This picture shows the raw silk in bales as it is received in this country. F the bales are weighed and then opened and the bundles of skeins placed on shelves, ready for use.

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The skeins of raw silk, after having been soaked to soften the gum, are taken to the winding room we see here. You will see the skeins placed on two long rows of swifts, one above and one below. these the silk is wound onto bobbins, or large spools, which you see in the center, under the operator's

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Here we have a picture of a modern silk loom on which silk goods are woven. The designs which are seen above are woven into the fabric and can be seen on the completed goods at the man's knees.

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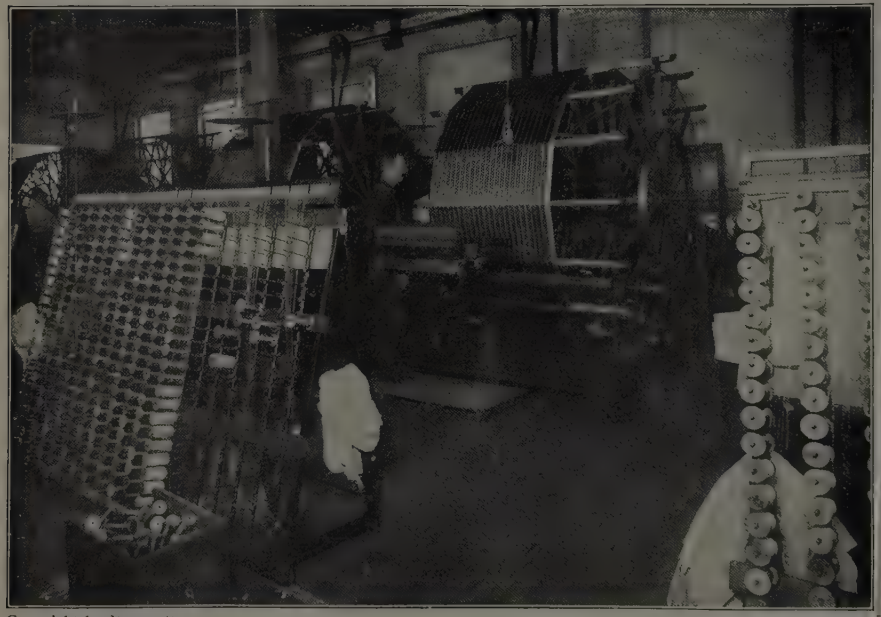
SPINNER. From the doubling frames the bobbins are placed on the spinner, as shown in this picture. On this machine the bobbins are made to revolve at great speed and the threads, which have been brought together on the doubling frame, are spun into one thread and carried onto another bobbin. In this way the various kinds of thread, as warp, sewing silk, machine twist, etc., are made.



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WARPING FRAME. The threads that run lengthwise in cloth are called warp. The warp is made by placing a large number of bobbins on a rack or creel, and running the threads from this on a reel into sections. The whole number of threads is then wound from the reel to a roll or loom beam. The picture shows the warping frame, the rack or creel, etc.

(I) UNIFICATION OF ITALY:

1. WORK OF CAVOUR, VICTOR EMMANUEL, GARIBALDI: Italy 948; Cavour 353; Victor Emmanuel 2018; Garibaldi 737; Mazzini 1193.

(II) THE FRANCO-PRUSSIAN WAR AND ITS OUTCOME: 707; France 705; German Empire 759.

I. AMERICAN HISTORY.

1. THE DISCOVERY OF AMERICA — THE ATTEMPT TO GET TO THE FAR EAST:
   a. Prince Henry the Navigator and his efforts to sail around Africa to India and the East: 864; Cape of Good Hope, 329; Madeira, 1141; Portuguese 1535.
   b. Columbus: His attempts to get to the East by sailing west. The discovery of the West Indies and the mainland: 430; West Indies, 2070; Marco Polo, 1520; Geography, 745; Isabella, 944; Vespucci, 2016.
   c. John Cabot and his discovery of land to the north — the east coast of north America: 301; Maine, 1149; Acadia, 6; Massachusetts, 1186.
   d. Magellan's voyage around the world — the Far East reached by sailing west — Columbus' dream realized: 1144; Columbus, 431; Philippine Islands, 1469.

2. COLONIZATION OF NORTH AMERICA AND THE EXPLORATION OF THE INTERIOR COUNTRY:
   a. The Spanish:
      (1) The Spanish conquest and settlement of Mexico: 462; Mexico, 1216.
      (2) De Soto and the discovery of the Mississippi: 523; Mississippi, 1240.
      (3) Coronado and his exploration in the Southwest: 459.
      (4) The Spanish missions: 100; San Antonio, 1671; Los Angeles, 1116; San Francisco, 1672.
   b. The French:
      (1) Cartier and his exploration of the St. Lawrence — taking possession of New France: 343.
      (2) Champlain — the Governor of New France: 365.
         (a) Founding and settlement of Quebec and Montreal: 1443, 1273.
         (b) Discovery and naming of Lake Champlain: 365, 2013.
      (3) Frontenac, Compte de: 720.
      (4) Nicollet and his exploration of land around the Great Lakes: 2099.
      (5) Joliet and Marquette and the discovery of the upper Mississippi: 977; Marquette, 1175, 714; Illinois, 916.
      (6) La Salle: 1032; Hennepin, 861; Tonty, 1923; Louisiana, 1119.
      (7) The French fur-trade: 1660, 2100.
      (8) The Jesuits and their work: 1175, 379.
      (9) French towns in the Middle West: 2100; Chicago, 379; Illinois, 916; Hennepin, 861; La Salle, 1032; Mississippi, 1240; Natchez, 1305; Iberville, 908; Mobile, 1244; New Orleans, 1330; St. Louis, 1660; Erie, 624; Detroit, 524.
      (10) Mississippi Scheme: 1038; Bienville, 210.
   c. The English:
      (1) The settlement of Virginia: 2024, 1770.
         (a) The settlers who came — their reasons for coming: 1770; Lord Delaware, 517.
         (b) The hardships of the voyage and at Jamestown: 959.
         (c) The House of Burgesses: Jamestown, 959.
         (d) Negro slaves: 1766; and indentured servants: 918.
         (e) French and Indian War: Virginia, 2024.

(V) THE FRENCH REVOLUTION:

1. CAUSES OF THE REVOLUTION: 717; Turgot 1954.
2. LEADERS: Mirabeau 1238; Robespierre 1620; Danton 502; Marat 1167; Lafayette 1020: Necker 1316.
3. PARTIES: Girondists 768; Jacobins 955.
4. LOUIS XVI: 1117.
5. THE CALLING OF THE STATES-GENERAL: 717; 1813.
6. THE NATIONAL ASSEMBLY: 717.
7. STORMING OF THE BASTILLE: 180, 717.
8. THE NEW CONSTITUTION: 717.
9. THE NATIONAL CONVENTION:
   a. The establishment of the republic and abolition of monarchy: 717.
   b. Execution of the king: 717; Louis XVI 1118.
10. THE REIGN OF TERROR: 717.
11. ENTRANCE OF NAPOLEON BONAPARTE: 717.

(VI) NAPOLEON AT THE HEAD OF FRANCE:

1. WARS IN ITALY AND EGYPT: 1301.
2. NAPOLEON AS CONSUL: FALL OF THE DIRECTORATE: 1301.
3. RE-ORGANIZATION OF THE GOVERNMENT OF FRANCE: 704-5.
4. NAPOLEON MADE EMPEROR: 1301; France 705.
5. THE SUBJECTION OF EUROPE: 1301; 705.
   a. War against the Austrians:
      (1) Battle of Austerlitz: 141.
   b. Battle of Trafalgar: 1934; Nelson 1319.
   c. War with Prussia: 1301; Jena 969.
   d. Napoleon in control of Portugal and Spain: Soult 1782; Junot 983.
   e. Annexation of Holland: 879.
   f. The invasion of Russia: 1302.
6. FALL OF NAPOLEON:
   a. Battle of Leipsic: 1051; 1302.
   b. Abdication of Napoleon: 1302.
   c. Congress of Vienna: 799.
      (1) Battle of Waterloo: 2052; Napoleon 1302; Ney 1345; Bluch 230.

(VII) REVOLUTIONARY MOVEMENTS IN EUROPE IN 1830:
Belgium 195; France 369; Italy 1193; Mazzini 1193; Greece 8(

(VIII) THE INDUSTRIAL REVOLUTION IN EUROPE:
Blanc 226; Leclaire 2044.

(IX) REVOLUTIONS OF 1848:

1. IN FRANCE:
   a. The overthrow of Louis Philippe and establishment of the second empir 1118; France 705; Napoleon III 1302.
2. IN GERMANY AND ITALY: German Empire 759; Italy 948.

(X) UNIFICATION OF GERMANY:

1. THE WORK OF BISMARCK: 759; Bismarck 219.

7. THE AGE OF PERICLES: 1452; 399.
   a. Building of the Long Walls: 130.
   b. Relations with Sparta: 1453.
   c. The Confederacy of Delos: 518.
   d. Art, Literature and Religion: Art 669; Seven Wonders 1727; Apelles 82; Æsop, Æschylus Æsculapius 21; Diana 527; Pluto 1507; vases 2005; Parthenon 1426; literature 1082; Homer 882; Herodotus 868; philosophy 1472; philology 1471; libraries 1063; astronomy 127; theatre 1898; œdipus 372; drama 550; calendar 306; Euripides 632; Anaxagoras 69.
   e. Famous men: Pericles 1452; Herodotus 868; Phidias 1465; Socrates 1777; hemlock 860; Epicurus 621; Pythagoras 1567; Thucydides 1908; Diogenes 533; Aristides 97; Pisistratus 1441; Aristotle, Aristophanes 97; Plato 1502; Euclid 631; Pindar 1491; Alcibiades 41; Theophrastus 1900.
8. THE PELOPONNESIAN WAR: Peloponnesus 1443; Corinth 455; Pericles 1453; Bœotia 233; trireme 1943; Arcadia 90; Thucydides 1908; Nicias 1348.
   a. The victory of Sparta: 1792; 620; 41.
9. RISE OF MACEDON AND ITS CONQUEST OF GREECE: 1135; 1468; 1906.
   a. Opposition of Demosthenes: 519.
10. THE EMPIRE OF ALEXANDER: 44; Greece 801; Egypt 591; Diogenes 533. See, also, Chart III.
   a. Conquest of Persia: 455; 1899.
   b. Alexander made emperor of Persia: 44.

I. HISTORY OF THE ROMANS.

1. ROME:
   a. Early history of the Romans: 1626; Etruria 630; Veii 2007; pottery 1539; Pompeii 1524.
   b. The founding of the city: 1629; 1631.
   c. Stories of the kings: Numa Pompilius 1365; Sabines 1651; Tarquin 1872; Horatius 885.
2. ROME AS A REPUBLIC: 1627.
   a. The plebians and what they wanted: 1941.
   b. Cincinnatus: 400.
   c. Works of the kings and emperors: 1629; Tarquin 1872; circus 401; Janus 960.
3. ROME AND CARTHAGE:
   a. Carthage and its people: 342; 1995.
   b. Rome and Carthage compared: 342.
   c. The Punic Wars: 343; 1562; Utica 1995; Hannibal 834; Hamilcar 830; Hasdrubal 846; Trasimenus 1939; Cannæ 323; Sicily 1751; Scipio 1706; Numidia 1365; Zama 2128.
   d. The destruction of Carthage: 343; Scipio 1707.
4. CONQUEST OF MACEDONIA AND GREECE: Roman Empire 1627; Macedonia 1135; Corinth 455; Polybius 1521.
5. CIVIL WAR IN ROME: 1627.
   a. The Gracchi: 788.
   b. Mærius and Sulla: 1172; 1845; Mithridates 1243.
   c. Caesar and Pompey: 303; 1524; Lepidus 1056; triumvirate 1943; Rubicon 1641; Sparta 1792; France 704; Helvetii 860; Catiline 251.
6. ROME AS AN EMPIRE:
   a. Work of Julius Cæsar: 303; calendar 306; libraries 1063; Cleopatra 408; Antony 81; Brutus 280; literature 1083.
   b. The reign of Augustus: 137; 1627; Actium 9; Antony 81; Lepidus 1056; Prætorian Guard, 1542; Arminius 105; German empire 758.
   c. The reigns of Trajan, Hadrian and Marcus Aurelius: 1627; Trajan 1934; York 2123; Hadrian 822; Aurelius 139.
   d. The division of the empire: 1627; Diocletian 533; Constantine 447.
   e. The downfall of Rome: 1627.

III. THE HEBREWS.

1. **THE ORIGIN OF THE PEOPLE:** Palestine 1411; Semites 1722; Jews 971; Syria 1862; Abraham 4; Ur 1991; Moses 1269; Nebo 1314; Jacob 955; Josephus 979.

2. **THE WANDERING:** 971; Egypt 591; Joshua 979.

2. **THE CAPTIVITY:** Cyrus 493; Babylonia 153; Nebuchadrezzar 1315; Esther 627.

4. **THE WORK OF THE PROPHETS:** Jeremiah 969; Job 973; Isaiah 944; Daniel 501; Samuel 1670; Elias 605; Ezekiel 644; Maccabees 1130; Habakkuk 820.

5. **SAUL THE FIRST KING:** 1683; Philistines 1470.

6. **DAVID THE HERO OF THE JEWS:** 506; Jews 972; Assyria 125; armor 10

7. **SOLOMON THE ORGANIZER OF THE GOVERNMENT:** 1779; 1963.

8. **THEIR LITERATURE:** Bible 209; literature 1081; calendar 306.

9. **THE DIVISION OF THE KINGDOM:** Palestine 1411; Samaria 1669; Jews 97

See, also, Charts I and II.

IV. THE PHŒNICIANS.

1. **THE LAND OF PHŒNICIA:** 1473; 1722; 1862; 302.

2. **LOCATION OF TYRE AND SIDON:** 1963; 1753; 1862.

3. **AS MERCHANTS, TRADERS AND SEAMEN:** 1753; 1963; 745.

4. **THEIR ARTS AND PRODUCTS:** 1753; 1722; 2113.

5. **COLONIES ON THE MEDITERRANEAN COASTS:** 1473; Carthage 343; Sic 1751; Cyprus 493; Thebes 1899; Utica 1995; Malta 1153; Spa 1788.

V. HISTORY OF THE GREEKS.

1. **THE EARLIEST GREEKS: Greece** 801; Pelasgians 1442; Argos 96; Tiry 1915; Aryans 116; Crete 477; Epirus 622.
   a. **The migration into Greece:** 801; 545.
   b. **What Homer tells of them:** 882; Argonauts 95; Cassandra 346; Ulys 1965; Troy 1945; Helen 858; Achilles 7; Paris 1422; Agamemn 25; Arion 96; Orestes 1392; Æneas 17.

2. **GREEK COLONIZATION:** Colony 427; Corinth 455; Sicily 1751; Syracuse 18 Dorians 545; Smyrna 1772; Cyprus 493; Eubœa 630.

3. **SPARTA:** 801; 1792; 26.
   a. **The three classes of citizens:** 1792; 1453; 578.
   b. **The institutions and laws of Lycurgus:** 1125; 1792.

4. **ATHENS:** 130; Attica 134; Greece 801; Bœotia 233; Aristides 97.
   a. **The laws of Draco:** 547; 1779.
   b. **Solon the lawgiver of Athens:** 1779; 94; 480.
   c. **The oracles and the Olympian games:** 1387; 1381; Pythian games 15 Delos 518; Milo 1228.

5. **THE WARS WITH PERSIA:** Darius 504; Xenophon 2117; armor 105; trire 1943.
   a. **Battle of Marathon:** 1167; Miltiades 1228; Aristides 97; Plataea 15 Cimon 399.
   b. **Battle of Thermopylæ:** 1901; 1056.
   c. **Salamis and Platæa:** 1664; 1502; 1899.

6. **REBUILDING OF ATHENS:** 130.

CHART I.

B.C.	Hebrew Nation	Egypt	Greece
	2350. The Flood. 1921. Call of Abraham. 1728. Joseph sold into Egypt. 1706. Jacob removes into Egypt. 1574. Aaron born. 1571. Moses born. 1491. Exodus from Egypt. 1491. The Law given on Sinai. 1451. Moses died. 1451. Joshua leads Israel into Canaan. 1300. Judges rule Israel for 450 years.	**Cheops**, who built the great pyramid. 1350. Sesostus conquers Asia.	
	85. Deborah judges Israel. 45. **Gideon** slaughters Midianites.		Fabulous. 63. Jason and the Argonauts. Birth of Hercules.
00	88. Jephthah. 56 Eli judges Israel. 37. **Samson**. 20. **Samuel**.		94. Trojan War begins. 84. Troy taken.
00	95. **Saul** anointed King. 55. Slain by the Philistines. 55. **David** reigns. 43. He subdues the Philistines, Ammonites and Syrians. 23. Absalom revolts and is slain. 15. **Solomon** King. 4. Temple dedicated.		69 Codrus, last king of Athens, died. 68. Archons chosen instead of kings. 43. Ionians settle in Asia.
00	75. Solomon died 75. Rehoboam reigns. 75. Ten Tribes revolt under Jeroboam.	78. **Shishak**, builder of second pyramid. 71. He conquers Judea, takes Jerusalem and plunders the temple.	**Amphyctionic Council**, composed of representatives of principal Greek States, is made the court for settling interstate disputes. Hesiod, poet.
	Judah / **Israel**		
	58. Abijah defeats Jeroboam. 55. Asa, a pious king. 4. Jehoshaphat. / 75. Jeroboam I. 54. Nadab. 26. Samaria built. 18. Ahab and Jezebel.		
0	89. Jehoram. 88. Jerusalem plundered by Philistines. 78. Joash. 40. Slays Zachariah, priest. 26. Jerusalem taken by Jehoash. / **Elijah** the prophet. 88. **Elisha** the prophet. 84. Jehu. 40. Jehoash; he defeats Benhadad, king of Syria.		**Homer**, the greatest of Greek poets. 80. Lycurgus, "The Spartan Lawgiver."
0			

NOTE. Full explanation of the History Charts and their use will be found on pages 2234 and 2235 immediately preceding History Outlines.

CHART II.

B.C.	Judah	Israel	Assyrian Empire	Greece	Rome
	Uzziah. Joel the prophet. Amos the prophet. 59. Jotham. 42 Ahaz; made tribute to Tiglath-Pileser. 26. Hezekiah. Isaiah the prophet. Nahum the prophet 10. Sennacherib destroyed.	Jonah the prophet. 84. Anarchy. 47. Invasion of Tiglath-Pileser. 30. Hosea; pays tribute to Shalmanezar. 21. The Ten Tribes carried captive to Assyria. 9. Esarhaddon.	47. Tiglath-Pileser. 28. Shalmanezar.	76. Epoch of the Olympiads from which the Greeks reckoned time. 46. Austomenes, last king of Corinth.	53. Rome founded Romulus. 15. Numa Pompilius. 8. Tarentum founded.
700	97 Manasseh. 42. Amon. 41. Josiah. Jeremiah the prophet. Zephaniah the prophet. Habakkuk the prophet. 6. Jerusalem taken by Nebuchadnezzar.	**Babylonian Empire** Esarhaddon reigns at Babylon. He plants colonies in Samaria whose descendants are called Samaritans. 6. Nebuchadnezzar; he defeats Necho of Egypt, and takes Jerusalem.		85. Second Messenian War. 24. Bloody code of Draco. Sappho, poetess. Ascendency of Sparta.	72. Tullus Hostilius. 40. Ancus Martius; subdues the Latin 16. Tarquin the Elder.
600	98. Jehoiachin. 96. Zedekiah. 88. Jerusalem destroyed. Ezekiel the prophet Jews carried captive to Babylon. 61. Evilmerodach. 60. Neriglissar. 55. Belshazzar. 38. Babylon taken by Cyrus the Mede, who establishes the	Nineveh destroyed by Nebuchadnezzar.		94. Solon, the Athenian Lawgiver. 62. Comedies first exhibited at Athens. 60. Pisistratus. Thales, founder of Ionic philosophy. 60. Temples built. 34. Thespis exhibits tragedies first at Athens. Pythagoras, philosopher. 10. Hippias expelled.	78. Servius Tullius. 34. Tarquin the Proud 9. The Republic. Consuls chosen. 1. Dictatorship create
	Medo-Persian Empire 36. Cyrus' decree restoring the Jews. 21. Darius. Zechariah the prophet. Haggai the prophet. 15. Second temple dedicated.				
500	94. Darius invades Greece. 90. His army defeated at Marathon. 85. Xerxes the Great. 81. He invades Greece. 80. He returns defeated. 67. Ezra returns to Jerusalem. 64. Artaxerxes I. or Ahasuerus. 56. He makes Esther Queen. 55. Nehemiah rebuilds Jerusalem. Malachi, last of Old Testament writers.			Anacreon, poet. 91. Death of Thucydides, historian. 90. Miltiades defeats the Persians at Marathon. 80. Xerxes defeated at Thermopylæ. 79. Persians defeated at Plataea. Æschylus, poet. 64. Third Messenian War. 45. Herodotus, historian. 31. Peloponnesian War. 29. Death of Pericles. Euripides, poet. Sophocles, poet. Socrates, the great moralist.	93. Tribunes chosen. 82. Coriolanus. 56. Cincinnatus, dic 51. Laws of the Tw Tables. Decemvirs appoin 45. Military Tribunes ated.
400					

CHART III.

ersian Empire	Greece	Macedon	Rome
xes Mnemnon.	95. Corinthian War begins.		91. Gauls invaded Rome.
volts.	80. Olynthian War.		90. Rome burned by Gauls.
at the battle of a.	78. Theban War.		
	71. Battle of Leuctra.		69. Military Tribunes abolished.
	63. Battle of Matineia.		
Codomanus.	61. Death of Hippocrates.		
	51. Death of Xenophon, historian.		43. Samnian War begins, lasts 71 years.
	48. Death of Plato, philosopher.	59. Philip the Great.	
	38. War with Macedon.		
	38. Battle of Chæronea; Philip victorious.		40. Latin cities surrender.

Macedonian Empire

36. Alexander the Great.
34. Invades Persia. Battle of Granicus.
32. Conquers Egypt and Tyre.
30. Battle of Arbela. Persia subdued.
28. Alexander dies at Babylon.
35. Conquers Athens and Thebes.
33. Battle of Issus; Darius defeated.
32. Alexander in Jerusalem.
28. Defeats Pontus of India.

At the death of Alexander, the Macedonian Empire was divided into numerous States

ypt	Judea Subject to Egypt	Syria	Greece	Macedonia	
ny Lagus, ander.	founds Library of	Seleucus.	97. Republic re-established.	98. Philip IV.	80. Pyrrhus, king of Epirus defeats the Romans.
Philadelphus.		88. Antiochus I.	81. Achæan League formed.	88. Macedonia subdued by Lysimachus King of Thrace.	74. He is driven from Italy.
Evergetes.		46. Seleucus II.	64. Death of Zeno, philosopher.		65. First Punic War.
Philopater.		26. Seleucus III.	71. Death of Epicurus, philosopher.		55. Carthaginians defeated by Regulus.
Epiphanes.		23. Antiochus the Great.	51. Achæan League renewed.		18. Second Punic War.
					18. Hannibal crosses the Alps; Romans defeated at Ticinus and Trebia.
					16. Battle of Cannæ.
					14. First Macedonian War.
					8. Scipio sent to Africa.
					2. He defeats Hannibal.
	Antiochus takes Judea and repels the Egyptians.	75. Antiochus IV.	91. Sparta becomes a member of the league.	78. Perseus.	Second Macedonian War.
Philome-	65. Judas defeats Antiochus.			68. Battle of Pydna.	72. Third Macedonian War. Perseus defeated.
Physcon.	35. John Hyrcanus frees Judea from power of Syria.	30. Antiochus VII.	88. Laws of Lycurgus abolished.	Macedonia made a Roman province.	
Lathyrus.	6. Aristobulus.	23. Antiochus VIII.		49. Third Punic War.	
	5. Alexander Jannæus.	12. Antiochus IX.	46. Corinth taken; Greece made a Roman province.		
			46. Carthage destroyed.		
			84. First Servile War.		33. Spain conquered.
			2. Second Servile War.		The Gracchi.
		95. Antiochus X.	90. Social War.		54. Death of Lucretius, poet.
Alexander.	70. Hyrcanus II.	92. Antiochus XI.	88. First Pontian War.		35. Death of Sallust, historian.
	67. Aristobulus II.	87. Antiochus XII.	86. Second Pontian War.		19. Death of Virgil, poet.
		69. Antiochus XIII.	73. Third Servile War, under Spartacus.		8. Death of Horace, poet.

ce, Queen.	66. Pompey subdues Syria and Judea.	63. Cicero crushes Cataline.
	60. First Triumvirate—Pompey, Crassus and Cæsar.	
	55. Cæsar invades Britain.	53. Crassus slain by Parthians.
ra.	48. Civil War between Cæsar and Pompey.	
	47. Battle of Pharsalia; Pompey defeated.	
	45. Cæsar Dictator.	44. Cæsar assassinated.
	43. Second Triumvirate—Octavius, Antony and Lepidus.	31. Antony overthrown.
subdued.		30. Octavius, surnamed Augustus, Emperor.

CHART IV.

A. D.			
	THE ADVENT.		
	14. Augustus died.	71.	**Livy**, historian, died.
	Tiberius, Emperor.	25.	Strabo, historian, died.
	36. Caligula.	65.	**Seneca**, philosopher, put to death by N
	41. Claudius.	79.	Pliny the Elder died.
	54. **Nero.**	79.	Herculaneum and Pompeii destroyed
	70. Vespasian.		eruption of Vesuvius.
	70. Jerusalem destroyed.	81.	Agricola conquers Britain.
	79. Titus.	97.	**Quintilian**, orator and writer, died.
	81. Domitian.	97.	**Josephus**, Jewish historian, died.
	98. Trajan.		
100	17. Hadrian, surnamed The Best.	15.	Pliny the Younger died.
	37. He rebuilds Jerusalem.	20.	**Plutarch**, biographer, died.
	38. **Antoninus Pius.**	28.	Juvenal, poet, died.
	61. **Marcus Aurelius.**	35.	**Tacitus**, historian, died.
	80. Commodus.		
	93. Septimius Severus.		
200	11. Caracalla and Geta, sons of Severus.		
	18. Heliogabalus.		**Tertullian**, an able defender of Christi
	22. Alexander Severus.		ity, originally a pagan.
	68. Claudius II.		
	70. Aurelian; he defeats the Goths and Ger-	54.	**Origen** suffers martyrdom.
	mans.		
	84. Diocletian.		
300	12. **Constantine** the Great.		
	30. Seat of Empire removed to Constantinople.		
	61. Julian the Apostate.	16.	**Arius.**
	64. Empire divided.		
	Valentinian Emperor of the West.	25.	Council of Nice.
	Valens of the East.		
	79. Theodosius the Great, reunites the Empire.		
	95. Empire permanently divided.	35.	Athanasius, bishop of Alexander, exile
	Arcadius Emperor of the West.		
	Honorius of the East.		
400	Alaric the Goth invades Italy.		
	9. Invasion of Spain by the Vandals, Alians,		
	and Suevi.		
	10. Alaric sacked Rome.	7.	**St. Chrysostom** died.
	51. Attila the Hun defeated.		
	55. Rome plundered by the Vandals under		
	Genseric.		
	75. Romulus Augustulus, last Emperor of	30.	**St. Augustine** died.
	Rome.		
	76. Roman Empire overthrown by Odoacer,		
	King of the Heruli.		
500			

It is not deemed necessary to represent the next five centuries by Charts, as little or no progress w
made in intellectual or national life during that period.

CHART V.

England	France	Germany	Various Countries
2. Massacre of St. Brice. 3. Danish Kings. 17. Canute I., the Great. 39. Canute II. 41. Saxons Restored. Edward the Confessor. 44. Common Law Established. 66. Norman Kings. William the Conqueror.	Robert II. Son of Hugh Capet. 31. Henry I. 60. Philip I. Invasion of William the Conqueror. 96. First Crusade.	2. St. Henry. 24. Conrad II. 39. Henry III. 56. Henry IV. 73. War with Saracens begins.	35. Kingdom of Aragon. 54. Schism or separation of the Greek Church from Rome. 65. Turks take Jerusalem. 73. War of Investitures. 73. Hildebrand becomes Pope Gregory VII.
Henry I. Usurper. 54. Henry II. House of Plantagenet. 71. Ireland subdued. 89. Richard I. Cœur de Leon. 99. John.	8. Louis VI. the Fat. 37. Louis VII. 46. Second Crusade. 80. Philip II. 87. Third Crusade. 94. Fourth Crusade. Abelard, Scholastic Philosopher.	6. Henry V. 38. Conrad III. 52. Frederic I. (Barbarossa) invades Italy. 63. Berlin founded. 95. Two Sicilies acquired.	Crusaders take Jerusalem. 25. Venetian Wars. 59. Alexander III. Italy. 71. Saladin, Sultan of Egypt. 94. Innocent III., Pope.
15. The Magna Charta Signed. 16. Henry III. 62. The Barons' War. 65. Barons defeated by Edward at Eversham. 72. Edward I. 82. Wales conquered. 84. Title Prince of Wales created.	8. Albigensian Crusade. 23. Louis VIII. 26. Louis IX. 28. Sixth Crusade. 45. Seventh Crusade. 70. Eighth Crusade. 85. Philip IV.	8. Otto IV. 12. Frederic II. 41. League of Hansetowns. 73. House of Hapsburg. Rodolph I.	4. The Inquisition instituted. 15. Doctrine of Transubstantiation and Auricular Confession established. 18. Genghis Khan, Mogul, subdues Persia. 29. Laity prohibited from reading the Scriptures. 88. Kingdom of Granada. 65. Dante born. 82. Sicilian Vespers.
7. Edward II. 14. Battle of Bannockburn. 27. Edward III. 28. Chaucer born. 46. Battle of Crecy. 56. Battle of Poictiers. 77. Richard II. 84. John Wickliffe died. 99. Henry IV. House of Lancaster.	16. Philip V. 28. Philip VI. House of Valois. 45. Dauphiny annexed. 64. Charles V. 80. Charles VI. Froissart, historian.	7. William Tell. Switzerland revolts. 9. Henry VII. 30. *Gunpowder invented.* 38. German Princes deny the temporal power of Pope. 49. Charles IV. 56. He issues the "Golden Bull."	8. Popes removed to Avignon. 11. Knights Templars abolished. 21. Dante died. 74. Petrarch died. 87. Margaret, Queen of Denmark and Norway. 95. Tamerlane in Russia.
13. Henry V. Wars with France. 15. Battle of Agincourt. 22. Henry VI. 53. War of Roses. 61. Edward IV. House of York. 83. Richard III. House of Tudor. 85. Henry VII.	22. Charles VII. 29. Joan of Arc at Orleans. 30. She is burned by the English. 51. The English driven from France. 61. Louis XI. 85. Charles VIII.	15. Council of Constance. John Huss burned. 31. House of Austria. 35-58. *Printing invented.* 83. Martin Luther born.	Tamerlane overran Syria. House of Medici in Florence. 53. Constantinople taken by Turks. Isabella and Ferdinand unite Castile and Arragon. 92. Columbus discovers America.
9. Henry VIII. 13. Battle of Flodden. 33. Henry divorces Catherine and marries Anne Boleyn. 36. Beheads Anne and marries Jane Seymour. 47. Edward VI. Cranmer. 53. Bloody Mary. 58. Elizabeth reigns. [lished. 64. Church of England Estab- Puritan party formed. 87. Mary Queen of Scots beheaded.	Louis XII. 15. Francis I. 47. Henry II. 59. Francis II. 62. Huguenots' War. 64. John Calvin died. 72. Massacre of St. Bartholomew. 74. Henry III. 89. Henry IV. House of Bourbon.	16. Luther begins the Reformation. 19. Charles V. 21. Diet of Worms. 30. Augsburg Confession. 56. Charles abdicates. Ferdinand I. chosen Emperor.	4. French in America. 13. Leo X., Pope. 13. Ponce de Leon in Florida. 21. Wars of Charles V. in Italy. 32. Pizzarro conquers Peru. 33. Ivan IV. of Russia. 35. Order of Jesuits founded. 36. Cortez conquers Mexico. 56. Philip II. of Spain. 59. Frederick II. of Denmark.

CHART VI.

A. D.	England	France	Prussia and Germany	Various Countries
1600	3. James I. **House of Stuart** 11. Translation of Bible. 16. **Shakespeare** died. 25. Charles I. 26. Sir Francis Bacon died. 49. Oliver Cromwell. **The Commonwealth** 60. Stuarts restored. Charles II. 79. Habeas Corpus Act 85. James II. 88. William Prince of Orange.	10. Henry IV. murdered. 10. Louis XIII. 20. Navarre annexed. 29. Cardinal Richelieu. 43. Louis XIV. 48. Wars of the Fronde. 50. Des Cartes died. 85. Edict of Nantes revoked. 97. Peace of Ryswick.	18. Thirty Years' War begins. 20. Battle of Prague. 30. **Kepler** died. 32. Battle of Lutzen. 40. Frederick William the Great. 48. Peace of Westphalia. 78. Peace of Nimuegen	**1600** 9. Arminius, divine, die 11. Gustavus Adolphus Sweden. 42. **Galileo** died.—Italy 44. Christina crowned. 62. Catherine I. of Russi 89. **Peter the Great** Russia. 97. Charles XII. of Swede **1700** 12. St. Petersburg found 25. Catherine II.—Russi 27. Elizabeth.—Russia. 33. Franco-Polish war. 69. Clement XIV. 96. Napoleon invaded It 97. Peace of Campo For 98. Pius IV. deposed Napoleon.
1700	2. War with France. 13 Peace of Utrecht. 14. George I. **House of Hanover** 27. George II. 27. Sir Isaac Newton died. 29. Rise of Methodists. Wesley and Whitfield. 39. War with Spain. 46. Charles, son of Pretender, defeated at Culloden. 56. War with France. 56. Chatham, Prime Minister. 60. George III. 75. War with United States. 93. War with France. 94. Gibbon, historian, died. 96. Robert Burns died. 97. Edmund Burke died.	15. Louis XV. 38. Peace of Vienna. 48. Peace of Aix-la-Chapelle 56. War with England. 63. Peace of Paris. 74. Louis XVI. 78. Voltaire died. 83. Peace of Versailles. 89. States General. **The Revolution** 93. Republic declared. **Reign of Terror** 95. The Directory. 97. The Consulate.	4. Battle of Blenheim. 13. Peace of Utrecht. 14. Peace of Rastadt. 22. Pragmatic Sanction. 40–48. War of the Austrian Succession. 40. **Frederic II.**, the Great. 41. Charles VII. 45. Francis I. 56. Seven Years' War begins. 65. Joseph II. 92. Francis II. 97. Frederic William III.	**1800** 1. Alexander.—Russia. 15. Netherlands united. 26. Nicholas.—Russia. 30. Belgium independent 49. Victor Emanuel II. - Italy. 55. Alexander II.—Russ 61. Russian serfs emar pated. 77. War between Russia Turkey. 81. Alexander II. ass nated. 81. Alexander III.—Russ 91. Famine in Russia. J expelled. 94. China-Japan War. 96. Nicholas II.—Russia. 98. Spanish-American W
1800	Ireland-Great Britain united. 5. Battle of Trafalgar. 7. Slave Trade abolished. 8. Peninsular War. 12. **War with U. S.** 14. Peace with France. 15. War with Napoleon 20. George IV. 29. William IV. 32. Sir Walter Scott died. 37. **Victoria** crowned. 54. Crimean War. 56. War with Persia, China. 57. Mutiny in India. 66. Atlantic Cable laid. 67. Fenian troubles. 67 War with Abyssinia. 72. Conference of Geneva. 78. Afghanistan War. 82. War in Egypt. 97. Queen's Diamond Jubilee. 98. Gladstone died. 99. Boer War.	4. **Bonaparte** Emperor. 12. Invades Russia. 13. Battle of Leipsic. 14. Louis XVIII. 15. **Waterloo.** Napoleon overthrown. 30. Louis Philippe. 35. Death of Lafayette. 47. Revolution. Louis Philippe abdicates. 48. Republic. 52. **Napoleon III.**, Emperor. 70. War with Prussia. Napoleon surrendered at Sedan. 71. **The Republic.** Thiers, President. 73. Napoleon III. died. 94. President Carnot assassinated.	04. Francis II. of Austria assumed title of Emperor. 05. Battle of Austerlitz. 06. Battle of Jena. 12. War with Russia. 13. War with France. 16. Germanic Confederation. 40. Frederic William IV. coronated. 48. Hungarian War. **Francis Joseph** becomes emperor of Austria-Hungary (1848-1916). 59. War with Italy and France. 61. **William I.** becomes King. 66. North German Confederation. 66. War with Prussia. 70. War with France. Gains Alsace-Lorraine. 71. King William I. made Emperor. 88. William I. died March 9. 88. Frederick III. died July 15. 88. William II. made Emperor. 98. Bismarck died.	**1900** 04. Russo-Japanese War. 11–13. Turco-Italian W Tripoli ceded to It 12. Civil War in China. 12–14. Balkan Wars. 15. It., Bulg. enter War. 17. U. S. enters World W 17. Russia becomes Repu 17–18. Finland, Ukra Esthonia, Lithua Latvia est. Republ 17. Greece joins Allies. 17. Jugoslavia forms Re 18. Poland becomes Repu 19. Italy gains Trentino. 19. Treaty of St Germ Austria reduced 20. D'Annunzio holds Fiu 20. Treaty of Sevres Tur loses Smyrna, Ada Syria, Palestine, M potamia, Armenia 20. League of Nations es 20. Bessarab. joins Rumai 20. Treaty of Trianon. H gary cedes terri to Rumania, Czec slovakia, Yugoslav 21. Fascisti control Italy. 22–23. Lausanne Trea Turkey regains C stantinople. 23. Spanish Military rectorate est. 24. Greece becomes Repu 24. Turkey becomes Re 26. Spain withdraws. enters L. of Natio 27. Tacna-Arica dispute tinues. 27. War in China contin
1900	01. Victoria died. 01. Edward VII. coronated. 02. Boer War concluded. 10. George V. coronated. 14. European War. 19. Treaty of Versailles. Gt. Bt. gains Ger Colonies in S. Africa, and mandate over Palestine, Mesopotamia, etc. 21. First Imperial Confer. 21. Anglo-Jap. alliance abolished. 22. Irish Free State established. 26. Dominions become self-governing units within British Commonwealth. See Chart XII.	01. Paris Exposition. 06. Fallieres, President. 13. Poincare, President. 14. World War. 19. Treaty of Versailles. Fr. gains Alsace-Lorraine (Europe), Cameroon, Toga (Africa), Syrian mandate. 20. Clemenceau resigns. 20. Millerand, Pres. ('20-24). 21. Briand, Premier. 22. Poincare, Premier. 24. Herriot, Premier. 24. Doumergue, Pres. 24. Jusserand retires. 25. Locarno Conf. Ger.-Fr. boundary settled. 26. Moroccan War ('19-26) ends. 26. Syria rebels.	01–10. Great com'l and indus. 14. World War. expansion. 18. Ger. Rev. Wm. II. abdicates. 19. Treaty of Ver. Ger. loses Alsace-Lorraine to Fr., E. territory to Pol. overseas ter. to Gt. Bt. and Japan. 19. Socialist Rev. suppressed. 19. Repub. constitution adopted. 20. Up. Schleswig unites with Den. 21. Up. Silesia vote belong to Ger. 24. Dawes' Reparation Plan est. 25. Friedrich Ebert first Pres. of Germany (7 yrs.) dies. 25. Hindenburg elected Pres. 25. Population 62,500,000. 25. Locarno Conf Bel.-Ger.-Fr. boundaries settled. 26. Ger. enters League of Nations. 27. German-Russian Treaty against engaging in war.	

CHART VII.

1001. Icelandic navigators visit the coast of New England.
1492. Columbus discovered America.
1497. Cabot discovered Newfoundland.
1499. Amerigo Vespucci visited America
1512. Ponce de Leon discovered Florida.
1513. Balboa discovered the Pacific.
1517. Cordova discovered Yucatan.
1521. Conquest of Mexico by Cortez.
1528. Narvaez's expedition to Florida.
1534. Cartier explores the St. Lawrence.
1541. De Soto discovers the Mississippi.
1564. Huguenots settle in Florida.
1565. Menendez founds St. Augustine.
1584-1587. Attempts to settle Roanoke Island

D.
00 7. First settlement in Virginia, at Jamestown.
9. Second Charter granted.
10. The starving time.
12. Third Charter granted.
15. Tobacco first cultivated.
19. *Slavery introduced.*
21. Cotton first cultivated.
22. Indian massacre at Jamestown.

New York
9. Henry Hudson discovers the Hudson River.
14. Dutch settle on Manhattan Island.

Massachusetts
20. The Pilgrims settle at Plymouth.
23. New Hampshire settled at Dover.
30. Boston settled.

32. Maryland granted to Lord Baltimore.
34. Settled by Catholics at St. Marys.

35. Connecticut settled at Hartford.
36. Rhode Island settled by Roger Williams.
37. Pequot War.
38. New Haven founded.
44. Second Indian massacre.
60. Navigation Act passed.
88. Harvard College founded.
89. Newport founded.
43. New England Colonial Union.
62. Charter granted.

64. North Carolina settled.
64. Captured by the English.
64. New Jersey settled at Elizabethtown.
70. South Carolina settled.
70. Charleston founded.
76. Bacon's Rebellion.
75. King Philip's War.
89. King William's War.
92. Witchcraft excitement.
82. Delaware separated from New York.
82. Pennsylvania settled by William Penn.

700 2. Queen Anne's War.
32. Washington born.
44. Negro plot.
41. New Hampshire separated from Massachusetts.
83. Georgia settled by Oglethorpe
54. French and Indian War.
70. Boston Massacre.
55. Braddock's defeat.
65. Colonial Congress.
Declaration of Rights.
73. Tea destroyed in Boston Harbor.
65. The Stamp Act.
The Virginia Resolutions.
74. Congress meets at Philadelphia.

REVOLUTIONARY WAR

76. Norfolk burned.
76. Battle of Long Island.
Battle of White Plains.
Forts Washington and Lee captured by the British.
75. Battle of Lexington.
Battle of Bunker Hill.
76. *Independence* declared.
77. Battle of Brandywine.
Battle of Germantown.
76. Battle of Trenton.
77. Battle of Princeton.
77. Battle of Bennington.
Saratoga—Surrender of Burgoyne.
78. Capture of Savannah.
79. Capture of Stony Point.
78. Battle of Monmouth.
79. Siege of Savannah.
80. Battle of King's Mountain.
81. Battle of Guilford Court House.
81. Surrender of Cornwallis.
80. Surrender of Charleston.
Battle of Monk's Corners.
Battle of Sander's Creek.
82. Cessation of hostilities.
83. Treaty of Peace.
81. Battle of Cowpens.
Battle of Camden.
87. Constitution adopted.
Battle of Eutaw Springs.
89. Washington elected President.

CHART VIII.

1789 GEORGE WASHINGTON, Pres't.
John Adams, Vice-President.
90. Indian troubles in Ohio.
90. General Harmar defeated.
90. Capital removed to Philadelphia.
91. Vermont admitted.
91. St. Clair defeated.
91. United States Bank established.
92. Kentucky admitted.
93. Whitney invents cotton gin.

George III.

WASHINGTON re-elected President.
John Adams, Vice-President
93. Difficulty with Genet, French Ambassador.
94. Whisky insurrection.
94. Wayne's victory at Maumee.
95. Jay's Treaty.
96. Tennessee admitted.

French Revolution.

98. Reign of Terror.

1797 JOHN ADAMS, President.
Thomas Jefferson, Vice-President.
98. War with France
99. Washington died, aged 67.
99. Treaty with France.
1800. Capital removed to Washington.

99. Overthrow of the Directory.
99. Napoleon Bonaparte first Consul.

1801 THOMAS JEFFERSON, President.
Aaron Burr, Vice-President.
1. War with Tripoli.
3. Ohio admitted into the Union.
3. Purchase of Louisiana.
3. Preble sent against Tripoli.
4. Hamilton killed by Burr.

4. Napoleon Emperor.
4. Irish Rebellion.

JEFFERSON re-elected President.
George Clinton, Vice-President.
6. Burr's Conspiracy.
7. English and French restrictions on commerce.
7. The Embargo Act passed.
7. Attack on the *Chesapeake*.
7. Fulton's first steamboat on the Hudson.

5. Battle of Austerlitz.
6. Battle of Jena.
8. Peninsular War.

1809 JAMES MADISON, President.
George Clinton, Vice-President.
11. Battle of Tippecanoe.
11. Fight between the *President* and the *Little Belt*.
12. War declared against England.
12. Louisiana admitted.
12. Surrender of Mackinaw.
12. Surrender of Queenstown.
Naval Battles.
12. The *Constitution* and the *Guerriere*.
12. The *Wasp* and the *Frolic*.
12. The *United States* and the *Macedonian*.
12. The *Constitution* and the *Java*.

9. Battle of Wagram.

MADISON re-elected President.
Elbridge Gerry, Vice-President,
13. Battle of Frenchtown.
13. Siege of Fort Meigs.
13. Perry's Victory.
13. Battle of the Thames.
Naval Battles.
13. The *Hornet* and the *Peacock*
13. The *Chesapeake* and the *Shannon*.
13. The *Argus* and the *Pelican*.
13. The *Enterprise* and the *Boxer*.
14. The Creek War ended at Horse Shoe Bend.
14. Battle of Lundy's Lane.
14. Washington captured and burned.
14. Battle of Plattsburg.
14 Hartford Convention.
14. Treaty of Ghent.
15. Battle of New Orleans.
16. Indiana admitted.

15. Battle of Waterloo.
Napoleon banished.
15. Treaty of Paris.
George IV.

1817 JAMES MONROE, President.
Daniel Tompkins, Vice-President.
17. Mississippi admitted.
18. The Seminole War.
18. Capture of Pensacola.
18. Illinois admitted.
19. Alabama admitted.
19. Florida purchased of Spain.
20. Maine admitted.
20. The Missouri Compromise.

MONROE re-elected President.
Daniel Tompkins, Vice-President.
21. Missouri admitted.
24. Visit of Lafayette.

21. Death of Napoleon.
Charles X.

CHART IX.

JOHN QUINCY ADAMS, President.
John C. Calhoun, Vice-President.
35. Controversy concerning removal of Creek Indians.

26. John Adams died.
26. Thomas Jefferson died.

Frederick William III.

ANDREW JACKSON, President.
John C. Calhoun, Vice-President.
32. Black Hawk War.
32. Excitement concerning tariff legislation.

32. Nullification in South Carolina.
32. The President vetoes the bill to recharter the United States Bank.

30. Louis Philippe.
30. Revolution in Poland.
32. Parliamentary Reform.

JACKSON, re-elected President.
Martin Van Buren, Vice-President.
33. Removal of public funds from the Bank of the United States.

35. Seminole War.
36. Arkansas admitted.

MARTIN VAN BUREN, President.
Richard M. Johnson, Vice-Pres't.
37. Great financial revulsion.

Continuation of Seminole War.
37. Battle of Okachotee.
37. Michigan admitted.

37. Victoria.

40. Frederick Wilhelm IV.

WILLIAM H. HARRISON, Pres't.
John Tyler, Vice-President.
President Harrison died April 4th, 1841.
TYLER, President.

41. The Northwestern boundary fixed by treaty.
41. Sub-Treasury bill repealed.
41. President vetoes the United States Bank.
43. The "Dorr Rebellion" in Rhode Island.

JAMES K. POLK, President.
George M. Dallas, Vice-President.
45. Florida admitted.
45. Texas annexed.
46. Iowa admitted.
46. General Taylor sent to the Rio Grande.
46. *War with Mexico* declared.
46. Battle of Palo Alto.
46. Battle of Resaca de la Palma.
46. Matamoras captured.
46. Monterey captured.

47. Battle of Buena Vista.
47. Capture of Vera Cruz.
47. Battle of Cerro Gordo.
47. Battle of Contreras.
47. Capture of Molino del Rey.
47. Capture of Chapultepec.
47. Fall of Mexico.
48. Treaty of Peace.
48. Gold discovered in California.
48. Wisconsin admitted.

48. Revolution in Hungary.

48. Republic proclaimed in France.

Louis Napoleon Bonaparte elected President.

ZACHARY TAYLOR, President.
Millard Fillmore, Vice-President.
49. Territory of *New Mexico* organized.
50. Taylor died July 9th.
FILLMORE, President.
50. *California* admitted into the Union.

50. Territory of *Utah* organized.
50. *Population of U. S. 23,191,876.*
51. Fugitive Slave Law enacted.
52. Henry Clay died, aged 75.
55. Daniel Webster died, aged 70.

FRANKLIN PIERCE, President.
W. R. King, Vice-President.
53. The *Gadsden Purchase.*

52. Kansas-Nebraska Bill passed.
54. Kansas struggle begun.
54. Perry's treaty with Japan.

52. Louis Napoleon, Emperor.
54. Crimean War.

JAMES BUCHANAN, President.
John C. Breckenridge, Vice-Pres't.
57. Mormon insurrection.
57. Continued violence in Kansas.
57. General monetary panic.

58. *Minnesota* admitted into the Union.
59. *Oregon* admitted into the Union.
59. John Brown's raid.
60. South Carolina secedes from the Union.
60. *Population of U. S. 31,443,231*

CHART X.

1861

ABRAHAM LINCOLN, President.
Hannibal Hamlin, Vice-President.

61. Mississippi, Alabama, Florida, Georgia, Louisiana and Texas secede.
61. Kansas admitted.
61. Southern Confederacy formed.
61. Attack on Sumter.
61. Virginia, Tennessee, North Carolina and Arkansas secede and join the Confederacy.
61. Seizure of Harper's Ferry and Norfolk.
61. Battle of Philippi.
61. Union repulse at Big Bethel.
61. Battle of Bull Run.
61. Battle of Wilson's Creek.
61. Battle of Ball's Bluff.
61. Battle of Belmont.
62. Battle of Mill Spring.
62. Capture of Fort Donelson.
62. The Monitor and the Merrimac.
62. Battle of Pea Ridge
62. Battle of Shiloh.
62. Capture of New Orleans.
62. McClellan's seven days' battles.
62. Battle of Richmond, Ky.
62. Second battle of Bull Run.
62. Battle of Corinth.
62. Battle of Antietam.
62. Battle of Fredericksburg.
62. Battle of Stone River.
63. The *Emancipation Proclamation.*
63. Battle of Chancellorsville.
63. Battle of Gettysburg.
63. Surrender of Vicksburg.
63. Draft riots in New York.
63. Battle of Chickamauga.
63. Battles of Lookout Mountain and Missionary Ridge.
63. *West Virginia* admitted.
64. Wilderness Battles.
64. Battle of Spottsylvania.
64. Battle of Cold Harbor.
64. Petersburg besieged.
64. Battle of Resaca.
64. Battle of Kenesaw.
64. Battle of Atlanta.
64. Battle of Mobile Bay.
64. Battle of Winchester.
64. Battle of Fisher's Hill.
64. Battle of Cedar Creek.
64. *Nevada* admitted.
64. Sherman's march to the sea.
64. Sinking of the Alabama.
65. Capture of Fort Fisher.

61. Prince Albert die

1865

LINCOLN re-elected President.
Andrew Johnson, Vice-President.

65. Battle of Bentonsville.
65. Battle of Five Forks.
65. Capture of Petersburg.
65. Fall of Richmond.
65. *Surrender of Lee.*
65. Surrender of Johnston.
65. *Lincoln Assassinated*, April 14.

ANDREW JOHNSON, President.

66. The Atlantic Cable laid.
66. Tennessee readmitted.
67. *Nebraska* admitted.
67. Purchase of Alaska.
67. Fourteenth Amendment adopted.
67. Amnesty proclamation.
68. Impeachment of President Johnson.

65. Fenian insurrec
Ireland.
66. Austro-Prussian
66. North German
eration formed

1869

ULYSSES S. GRANT, President.
Schuyler Colfax, Vice-President.

69. Pacific Railroad completed.
70. Fifteenth Amendment adopted.
70. *Population of U. S. 38,558,371.*
71. Chicago burned.
72. Settlement of the *Alabama Claims.*
72. Settlement of the *Northwestern Boundary.*
72. William H. Seward died, aged 71.
72. Horace Greeley died, aged 61.

70-71. Franco-Prus
71. Battle of Sedan,
Napoleon III. ove
72. King William pr
Emperor.
Rise of French
Thiers, Presi

1873

GRANT re-elected President.
Henry Wilson, Vice-President.

73. The Modoc War.
73. The great financial panic.
76. The Custer Massacre.
76. *Colorado* admitted.
76. The *Centennial Exhibition.*

1877

RUTHERFORD B. HAYES, Pres't.
William A. Wheeler, Vice-Pres't.

77. The Nez Perce War.
77. The Remonetization of Silver.
79. Resumption of Specie Payments.
80. *Population of U. S. 50,182,525.*

77. Russo-Turkish
Fall of Turki
in Europe.

1881

JAMES A. GARFIELD, President.
Chester A. Arthur, Vice-President.

81. President Garfield shot, July 2, by Charles J. Guiteau.
81. His death, September 19.
CHESTER A. ARTHUR, President.
82. Trial and sentence of Guiteau.

81. Alexander II.
assassinated

CHART XI

GROVER CLEVELAND, President.
Thomas A. Hendricks, Vice-Pres't.
85. Gen. U. S. Grant died, July 23.
85. Gen. Geo. B. McClellan died, Oct. 29.
86. Haymarket riot, Chicago.
86. Gen. John A. Logan died, Dec. 26.
88. General Sheridan died, August 5.

BENJAMIN HARRISON, President.
Levi P. Morton, Vice-President.
89. Washington admitted.
89. Montana admitted.
89. North and South Dakota admitted.
90. Idaho admitted.
90. Population of United States, 62,622,250.
Pan-American Congress.
Behring Sea arbitration.
Wyoming admitted.
91. General Sherman died, February 14.

GROVER CLEVELAND, President.
Adlai E. Stevenson, Vice-President.
93. Wilson tariff measure.
93. Commercial and monetary panic.
93. World's Columbian Exposition at Chicago.
94. Railroad riots at Chicago.
96. Venezuelan imbroglio.

WILLIAM McKINLEY, President.
Garrett A. Hobart, Vice-President.
98. Hawaii annexed.
98. Battleship *Maine* destroyed at Havana, February 15.
War with Spain declared, April 25.
Naval Victory, Manila Bay, May 1.
Battle of Guasimas, June 24.
Battle of San Juan and El Caney, July 1.
98. Naval Victory at Santiago, July 3.
Surrender of Spanish Army, Santiago.
Manila surrendered.
Treaty of Peace signed at Paris, Dec. 10.
Porto Rico, the Philippines and Guam ceded to the U. S.
Filipino revolt.
1900. Galveston destroyed by hurricane.
Population of U. S., 76,303,387.

WILLIAM McKINLEY, President.
Theodore Roosevelt, Vice-President.
President McKinley shot Sept. 6, died Sept. 14.
THEODORE ROOSEVELT, President.
Civil Government in the Philippines inaugurated July 4.
02. Cuban Government organized.
03. Dept. Commerce and Labor established.
03. Alaskan Boundary settled.
04. Panama Canal Treaty.
05. Mediation ends Russo-Japanese War.

THEODORE ROOSEVELT, President.
Chas. Warren Fairbanks, Vice-Pres't.
06. San Francisco destroyed by earthquake and fire.
06. Cuban revolt and intervention by U. S.
06. Pure food law passed.
07. Oklahoma admitted.
07. Financial panic.
08. Grover Cleveland died.

WILLIAM HOWARD TAFT, Pres't.
James S. Sherman, Vice-President.
09. North Pole reached by Robert E. Peary.
10. Population of United States, 91,972,266.
10. Postal Savings Banks established.
12. New Mexico and Arizona admitted.
12. Parcel Post established.
12. Progressive Party formed.
12. Titanic Disaster.
13. Dept. of Labor established.

WOODROW WILSON, President.
Thomas R. Marshall, Vice-President.
13. Chinese Republic recognized.
13. Seventeenth Amendment (Popular election of Senators).
13. Tariff revised.
13. Federal Income Tax law passed.
14. Federal Trade Commission established.
16. Labor Legislation.

WOODROW WILSON, President.
Thomas R. Marshall, Vice-President.
17. Germans declare Unrestricted Submarine Warfare.
17. War with Germany.
18. Armistice signed Nov. 11.
18. Government takes possession of Railroad, Telegraph and Telephone Systems.
19. Death of Ex-President Roosevelt.
19. Prohibition Amendment Ratified.

WARREN G. HARDING, President.
Calvin Coolidge, Vice-President.
21. Washington Limitation of Armaments Conference.
22. Federal Budget System established.
22. Peace Treaties signed with Germany and Austria.
23. President Harding died, Aug. 2.

CALVIN COOLIDGE, President.
24. Adjusted Compensation Law passed.
24. Teapot Dome Oil Inquiry.
24. Limitation of Immigration to 2% on 1910 census, with total exclusion of Oriental races.
24. Dawes' Debt Funding Commission appointed.
24. Ex-President Wilson died, Feb. 3.

CALVIN COOLIDGE, President.
Charles G. Dawes, Vice-President.
25. William Jennings Byran dies
25 Italian debt settlement made.
26. Federal Income Tax reduced.
27. U. S. fails to enter World Court
27. Dedication Am.-Canad. Peace Bridge.
27 Great Mississippi River flood.

88. William I., Germany died March 9.
Frederick III. of Germany died June 15.
William II., Emperor.
94. President Carnot of France assassinated.
97. War between Turkey and Greece.
Famine in India.
King Humbert of Italy assassinated July 29, 1900.
1900. Boxer rising in China.
Partition of Samoa.
Boer War.
Queen Victoria died Jan. 22, 1901.
Edward VII., King.
01-02. Boer War continued.
03. Panama established.
04. Russo-Japanese War.
05. Russo-Japanese War ends.
05. Union of Sweden and Norway dissolved.
Prince Charles of Denmark becomes King of Norway as Haakon VII.
06. First Russian Douma.
06. Frederick VII. King of Denmark.
08. Bulgarian independence declared.
08. Messina and Reggio destroyed by earthquake; 76,483 lives lost.
09. Turkish Revolution. Abdul Hamed II. deposed. Mehmed V. Sultan.
10. Edward VII. of England dies. George V. King.
10. Portuguese Republic established.
10. South African Union formed.
11. South Pole reached by Amundsen.
11. Turco-Italian War begins.
11. Revolution in Mexico.
12. Turco-Italian War ends.
12. Chinese Republic proclaimed.
12. Christian IX. of Denmark dies. Christian X. King.
12. Balkan War begins.
12. Mutsuhito, Emperor, Japan, dies.
13. George I. of Greece assassinated.
13. Balkan War ends.
14. Francis Ferdinand assassinated.
14. Great War begins.
16. Francis Joseph dies.
17. Russian Revolution.
17. Constantine I. of Greece deposed.
17. English capture Jerusalem.
18. Great War ends. (Surrender of Russia, Mar. 2; Roumania, Mar. 4; Bulgaria, Sept. 30; Turkey, Oct. 31; Austria, Nov. 3; Germany, Nov. 11.)
19. Peace treaty, including League of Nations, signed.
21. Egypt granted independence.
22. Polygamy illegal in Turkey.
22. Mussolini, Fascist leader, Premier of Italy.
23. Greatest earthquake of modern times in Tokyo region, Japan.
23. Mustapha Kemal Pasha elected President Turkish Republic, Oct.
24. Nikolai Lenin, head of Soviet Russia, died, Jan. 22.
24. France began evacuation of Ruhr.
24. Greece declared herself Republic.
24. Labor Government held office in Great Britain for first time. Ramsey MacDonald, Premier.
24. Labor Govt., Great Britain, defeated by Conservatives. Ex-Premier Baldwin became Premier.
25. President Ebert of Germany dies.
25. Soviet Russia grants further private ownership of industry and land.
25. Locarno Peace Treaties signed.
25. Spain Directorate abolished.
25. Boundary disagreements between Irish Free State and North Ireland settled.
26. Cardinal Mercier of Belgium dies.
26. War in China continues.
26. Amundsen and Byrd fly over North Pole.
27. War in China continues.
27. Canada celebrates 60 years of Confederation.
27. World Economic Conference at Geneva.
27. King Ferdinand of Roumania dies.
27. Charles Lindbergh and others make trans-continental flights over Atlantic.
27. Am.-British-Japanese naval limitation conference unsuccessful.

CHART XII.

1500 **French Period** 1600 1700

1497. Cabot discovered Newfoundland.
1498. Sebastian Cabot discovered Hudson Strait.
1500. Cortereal entered Gulf of St. Lawrence.
1518. Baron de Levy visited Sable Island.
1524. Verazzano explored coast of Nova Scotia.

34. Jacques Cartier — first landing on Canadian soil.
35. Cartier's second voyage — visits Stadcona (Quebec) and Hochelaga (Montreal).
76-78. Frobisher explores Arctic Canada.
85. John Davis discovered Davis Strait.
98. Marquis de la Roche lands convicts on Sable Island.

04. DeMonts and Champlain on coast of Nova Scotia.
05. Port Royal founded by Poutrincourt.
08. Quebec founded by Champlain.
09. Champlain defeated Iroquois and discovered Lake Champlain.
10. Henry Hudson explores Hudson Bay.
11. Jesuits arrive in Acadia.
13. St. Johns, Newfoundland, founded. Port Royal destroyed by Argall.
16. Wm. Baffin explores Baffin's Bay.
17. Iroquois invade Canada.
28. English in Nova Scotia.
29. Capture of Quebec by English.
32. Treaty of St. Germain. Quebec restored to France.
35. Lake Michigan discovered by Nicollet.
40. Lake Erie discovered by Jesuits.
42. Montreal founded.
54. Acadia taken by English.
55. Treaty of Westminster. Canada and Acadia restored to France.
68. Pere Marquette founded Mission at Sault Ste. Marie.
70. Hudson Bay Company founded.
89. Lachine massacre.
90. Phipps captures Port Royal — is repulsed at Quebec.
91. Schuyler's raid into Canada.
96. Nova Scotia made royal province.
98. Population of Canada 18,355.

09-11. Canada invade... Port Royal ta... son.
13. Treaty at Utrech... founded.
19. First governme... English in N...
45. Louisburg capt...
48. Louisburg rest... by Treaty of A...
49. Halifax founded.
55. Expulsion of Ac...
58. Representative ... tablished in ...

Seven Year

58. Capture of ... English.
58. Battle of Ticond...
59. Siege of Queb... French on ... ham by Gene... render of Que...
60. Capitulation of ...
63. Treaty of Pari... all its depe... rendered to ...

England

09. Henry VIII.
58. Bloody Mary.
58. Elizabeth.
87. Mary Queen of Scots beheaded.

France

15. Francis I.
47. Henry II.
59. Francis II.
62. Huguenot War.
74. Henry III.
89. Henry IV.

England

03. James I.
11. Translation of Bible.
49. Oliver Cromwell. The Commonwealth.
60. Charles II.
85. James II.
88. William, Prince of Orange. Milton. Locke.

France

10. Louis XIII.
29. Cardinal Richelieu.
43. Louis XIV.
48. Wars of the Fronde.
87. Peace of Ryswick.

Germany

18. Thirty Years' War begins.
40. Frederick William the Great.
48. Peace of Westphalia.

Engl...

02. War with Fran...
13. Peace of Utrec...
14. George I.
29. George II.
39. War with Spai...
46. Charles, son ... defeated at ...
56. War with Fran...
60. George III.
75. American Rev...
93. War with Fran...

CHART XII.

h Period

bout 60,000.
of Pontiac.
artly destroyed by

ard Island made
e province.

Revolution. Inva-
Canada by Ameri-
ntgomery defeated

Versailles. Can-
outhern boundary
ed.

swick and Cape
ade separate prov-

al Act. Province
into Upper and
Canada. Pop.

nded.

1800

09. First steamboat on St. Lawrence.
12. War of 1812.
12. Surrender of Detroit.
12. Americans repulsed at Queenston and at Odelltown.
13. Battle of Frenchtown.
13. Capture of Ogdensburg.
13. Battle of Stony Creek.
13. Battle of Lake Erie.
13. Battle of Moraviantown.
13. Battle of Chateaugay.
13. Battle of Chryslers Farm.
13. Capture of Fort Niagara.
14. Battle of La Colle Mill.
14. Fort Erie taken.
14. Battle of Chippewa.
14. Battle of Lundy's Lane.
14. Family Compact.
16. Common schools established in Upper Canada.
25. Miramichi fire.
33. "Royal William," first steamboat crossed the Atlantic from Quebec.
37-38. Papineau's Rebellion.
37-38. Mackenzie's Rebellion.
41. Upper and Lower Canada united.
42. Ashburton's Treaty, settling boundary dispute.
58. Capital removed to Ottawa.
58. Atlantic Cable laid.
64. Quebec conference.
66. Fenian invasion.
67. Confederation formed and Dominion proclaimed.

Dominion of Canada

67. Original Confederation.
Ontario, area 260,862 Sq. M.
Quebec, " 351,873 Sq. M.
Nova Scotia, 21,428 Sq. M.
New Brunswick, 27,985 Sq. M.
Lord Monck, first Governor-general.
69. Red River Rebellion.
70. Northwest territories added to Dominion.
70. Manitoba admitted.
70. Fenian raid.
71. Treaty of Washington.
71. British Columbia admitted.
71. First Dominion Census.
Pop. four provinces, 3,485,761
Manitoba, 18,995
British Columbia, 36,247
Prince Edw. Island, 94,021
Total, 3,635,024
78. Prince Edward Island admitted.
76. Keewatin Territory created; area 470,416 sq. miles.
77. Halifax fisheries award.
80. All British America except Newfoundland annexed to Dominion.
82. Districts of Assiniboia, Saskatchewan, Alberta and Athabasca created.
85. Saskatchewan Rebellion.
85. Canadian Pacific Railway completed.
95. Districts created from unorganized territory.
Ungava, area 354,961 Sq. M.
Franklin, " 500,000 Sq. M.
Mackenzie, " 562,182 Sq. M.
Yukon, " 196,976 Sq. M.
97. Behring Sea award, $464,000.
98. Yukon made a territory.

1900

01. Australian Federation completed.
02. First message by Pacific cable from Australia.
03. Alaskan boundary settlement.
03. Grand Trunk Pacific Railway 5,000 miles long projected.
04. Dominion exhibition in Winnipeg.
03. Earl Grey appointed Governor-General.
05. Provinces of Alberta and Saskatchewan created out of Northwest territories.
08. Government sustained in elections involving railway and development policies.
11. Borden elected Premier.
11. Duke of Connaught appointed Governor-General.
12. Boundaries of Manitoba, Ontario, Quebec and Northwest Territories enlarged; Ungava, Franklin and Mackenzie absorbed.
16. Conscription Law passed.
16. Prohibition in Ontario.
19. Treaty of Versailles.
19. Entered League of Nations.
21. Wm. Mackenzie King, Premier.
24. Non-Participation in Imperial Conference.
24. First Independent Treaty with Foreign Power.
26. First Ambassador to Washington, by agreement 1920.
26. Viscount Willingdon, Gov.-Gen.
27. Diamond Jubilee: 60 years Dominion status.
27. U.S.-Canadian Peace Bridge Ceremony.

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Countries

Austrian Succes-

I. the Great.
's War.
., Russia.
Russia.
een France and

vaded Italy.

England

05. Battle of Trafalgar.
07. Slave trade abolished.
08. Peninsular War.
14. Peace with France.
15. War with Napoleon renewed.
20. George IV.
29. William IV.
37. Victoria crowned.
54. Crimean War.
57. Mutiny in India.
67. War with Abyssinia.
97. Queen's diamond jubilee.
99. Boer War.

Various Countries

04. Bonaparte, emperor.
04. Francis II. of Austria.
14. Louis XVIII. of France.
15. Waterloo. Napoleon overthrown.
48. Hungarian War. Francis Joseph of Austria.
52. Napoleon III.
61. Alexander II. of Russia emancipates serfs.
70. War between Germany and France.
71. William I., Emperor of Germany.
71. Republic of France.
88. Frederick III. of Germany.
88. William II. of Germany.
94. China-Japan War.
98. Spanish-American War.

England

01. Victoria died.
01. Edward VII. King.
02. Boer War ended.
10. Ed. VII. died. George V. King.
10. South African Union formed.
11. Anglo-Jap. Alliance renewed.
11. Anglo-Am. Arbitration Treaty.
11. Lord's Veto Power abolished.
12. Colonial Defense Conference.
14. War with Germany.
15. Liberal Gov't. Premier Asquith.
16. Liberal Coalition Gov't. Premier George.
17. Irish Convention.
17. Imperial War Conference.
17. Palestine to England.
18. Woman Suffrage.
19. Versailles Treaty.
20. Treaty with Turkey.
21 Imperial Conference.
21. Anglo-Jap. Alliance abolished.
21. Ulster Parliament.
22. Egyptian Protect. abolished.
22. Irish Free State established.
22. Conser. Gov't. Premier Law.
23. Conser. Gov't. Prem. Baldwin.
24. Lab. Gov't. Prem. MacDonald.
24. Conser. Gov't. Prem. Baldwin.
26. Labor strike of 2,525,000 men.
26. Dominions become self-governing units within British Commonwealth of Nations.
27. U.S.-British-Japanese Naval Limitation Conference fails to reach agreement.

CHRONOLOGY OF THE GREAT WAR

1914

June 28—Archduke Ferdinand assassinated.
July 28—Austria declares war on Serbia.
Aug. 1—Germany declares war on Russia. France mobilizes.
2—Germans enter France. Russian troops enter Germany.
3—British fleet mobilizes.
4—France declares war on Germany; Germany declares war on Belgium; Great Britain on Germany. U. S. proclaims neutrality.
7—Germans defeated at Altkirch.
8—Germans capture Liege. British land troops in France.
12—Montenegro declares war on Germany.
20—Germans enter Brussels.
23—Japan declares war on Germany. Russia victorious in battles in East Prussia.
24—Japanese warships bombard Tsingtao.
28—English defeat German fleet near Helgoland.
29—Germans defeat Russians at Allenstein; occupy Amiens; advance to La Fere, sixty-five miles from Paris.
Sept. 1—Germans cross Marne.
2—Government of France transferred to Bordeaux. Russians capture Lemberg.
5—England, France, and Russia sign pact to make no separate peace.
6—French win battle of Marne.
14—Battle of Aisne. German retreat halted.
15—First battle of Soissons.
20—Russians capture Jaroslau and begin siege of Przemysl.
Oct. 9-10—Germans capture Antwerp.
29—Turkey begins war on Russia.
Nov. 7—Japanese take Tsingtao.
9—Cruiser Emden destroyed.
Dec. 14—Belgrade recaptured by Serbians. Total Austrian losses, 100,000.
16—German cruisers bombard Scarborough, Hartlepool and Whitby, undefended towns on English coast, killing fifty civilians.
25—Italy occupies Avlona, Albania.

1915

Jan. 1—British battleship Formidable sunk.
8—Violent fighting in the Argonne.
11—Germans thirty miles from Warsaw.
24—British win in North Sea.
29—Russian army invades Hungary.
Feb. 1—British repel strong German attack near LaBasse.
4—Russians capture Tarnow.
8—Turks at Dardanelles shelled by British.
11—Germans evacuate Lodz.
12—Germans drive Russians from po
tions in East Prussia, taki
26,000 prisoners.
14—Russians capture fortifications
Smolnik.
16—French capture two miles of Germ
trenches.
18—Germans blockade English a
French coasts.
19—British and French fleets bomba
Dardanelles.
21—American steamer Evelyn sunk
mine.
22—German war office announces c
ture of 100,000 Russian pris
ers in ten days in Mazurian La
region. American steamer Ca
sunk by mine.
28—Dardanelles entrance forts capitul
Mar. 4—Allies land troops on both sides
Dardanelles.
10—Battle of Neuve Chapelle begins.
14—Dresden sunk by English in
Pacific.
18—British battleships sunk in D
danelles.
22—Prussians take Przemysl.
23—Allies land troops on Gallipoli pe
sula.
25—Russians defeat Austrians.
April 16—Italy mobilizes 1,200,000 men. A
trians defeat Russians.
23—Germans force way across Y
Canal and take 1600 prisoner
25—Allies stop German drive on Y
line.
29—British report regaining of
thirds of lost ground in Y
battle.
May 7—Lusitania torpedoed.
9—French advance north of Arras.
23—Italy declares war on Austria.
June 3—Teutons recapture Przemysl.
26—Italians enter Austrian terri
south of Riva.
July 3—Italians capture Tolmino.
9—British make gains north of Y
and French retake trenches in
Vosges.
13—Germans defeated in the Argonn
29—Warsaw evacuated by Russ
Lublin captured by Austrian
Aug. 4—Germans occupy Warsaw.
14—Austrians and Germans concen
400,000 soldiers on Serbian f
ier.
Sept. 1—Germans promise to sink no
liners without warning.
4—German submarine torpedoes B
liner Hesperian.
9—Germans make air raid on Lo
killing twenty persons and w
ing 100 others.
—Ambassador Dumba recalled.
20—Germans begin drive on Serbia.
22—Russian army escapes Germa
circling movement.

except its magnificent ruins. It was generally designated The Glory of the East, and, according to ancient writers, "no other city could be compared with it either in beauty or in wealth." It was nearly or wholly destroyed by Alexander the Great in his conquest of Persia, and is scarcely mentioned in history afterward.

Perseus (*pĕr'sē-ŭs*), the Greek myth hero who slew the Medusa (*q. v.*) and set free the beautiful Andromeda (*q. v.*) who had been fastened to a rock and left as prey to a sea monster. The Medusa had hair made of snakes, a bad disposition and a third interest in an evil eye which turned all who looked upon it into stone. Perseus cut off her head but the beautiful Andromeda he married; "and they lived happily ever after."

Pershing, General John Joseph, Although Foch's assignment of Pershing to Alsace-Lorraine where the American troops first fought under the general's command and with such brilliant success was, of course, dictated by purely military reasons, there is something suggestive of the romantic days of knighthood in the fact that General Pershing is of Alsatian descent, although he is a native of Missouri where he was born on a farm in Linn County, September 13, 1860.

And no knight of the days of chivalry ever had a knightlier presence. Six feet in height, broad shouldered, straight as an arrow, clear eyed and direct, he looks every inch the soldier and the man. Few men, even in the military nations of Europe, have had so varied a military experience. Graduating from West Point in 1886, he at once began active service in the Southwest. In the Philippines he helped to subdue the savage Moros. On the Mexican border as successor to General Funston, he commanded the largest body of troops that had been assembled since the disbanding of the army of the Civil War, and on Mexican soil as well as in the Philippines, he demonstrated the resourcefulness under hard conditions which he had previously learned in the Apache Indian campaign in Mexico and Arizona in 1886 and the campaign against the Sioux Indians in 1891 and 1895.

Following the Spanish War, he organized the Bureau of Insular Affairs and was its chief until August 16, 1899. He had an opportunity to study modern warfare on the great scale as military observer with Kuroki's army during the Russo-Japanese War. He served on the general staff from 1903 to 1906. Like Foch he has been an instructor in military art, (incidentally he is a trained teacher, for he took his A.B. degree at the state normal school at Kirksville, Mo.). He was military instructor at the University of Nebraska from 1891–95, and later at the same time took a full course in law. Later he was for two years instructor in tactics at West Point.

Pershing first became a national figure in 1905, when President Roosevelt promoted him over the heads of 862 senior officers and made him a brigadier general. In 1909 Pershing returned to the Philippines as governor of Moro province, remaining there until he was called to the Mexican border in 1914. While he was serving on the border his wife and three daughters were burned to death in a fire at the Presidio, San Francisco; only his son Warren was saved. Finally came the call to France. It was a historic moment when Pershing arrived at Boulogne, June 13, 1917; for the first time an American commander was to lead American troops on European soil. On him rested the burden of organizing the A.E.F. Though his final test as a commander in operations was short, the achievements of the A.E.F. place him high among the leaders in the war.

Persia (*pĕr'shă*), the most extensive and powerful native kingdom of western Asia, consists for the most part of an elevated plateau, which in the center and on the east is almost a dead level, but on the nothwest and south is covered with mountain chains. It may be said to possess three climates: that of the gulf-coast, that of the elevated plateau and that of the Caspian provinces. Along the southern coast the heat of summer and autumn is severe, while in winter and spring the climate is delightful. On the plateau there are considerable differences of climate and considerable variation from heat to cold. About Ispahan the winters and summers are equally mild; but to the north and northwest of this the winters are severe; and the desert region of the center and east and the country on its border endure oppressive heat in summer and piercing cold in winter. Except in the Caspian provinces the atmosphere is remarkable for dryness and purity. The cultivated portions, when supplied with moisture, either by rainfall or irrigation, are very fertile. In some places two crops can be raised in the year. The principal products are wheat (the best in the world), barley, corn, sugar and rice. The vine flourishes in several provinces, and the wines of Shiraz are celebrated in eastern poetry. Opium and tobacco are among the considerable exports, together with wool, silk, cotton and the fine, Persian, hand-made carpets. Pearl-fishing and the mining of turquoises and precious stones are important industries.

Most Persians are Mohammedans, except the Sunnis and the Parsis (*q. v.*), who retain the ancient faith of Zoroaster.

The government is a constitutional monarchy with an elective national council and senate. The revenue is derived almost exclusively from a tax on the land and its products, and as a natural result the peasantry are seriously oppressed by the provincial governors. In 1905 the people demanded representative institutions and the shah consented to the establishment of a national council, but later was deposed and his son succeeded to the throne. At the beginning of the World War (*q. v.*) the Government was largely under the control of Russia, with a distinct

metal—in the latest models over 500 feet long—filled with ballonets containing gas, could stay up from 35 to 40 hours, make a round trip of 3,000 miles, and carry several tons of explosives. After the war, England made still larger craft, one of which, the R-34, in 1919, made the round trip between England and New York in 183 hours, 12 minutes, running time.

About the time the dirigible appeared, men produced its rival, the *airplane*. For many years, Maxim, using kites in England, Lilienthal, using bird-like wings on the continent of Europe, and Langley (*q. v.*) in America, had been experimenting. Langley's work was the most fruitful. In 1896 he constructed a small airplane which flew until, lacking a pilot to keep it balanced, the craft upset. Langley could not find an engine light enough to drive a model big enough to carry a man, but the soundness of his ideas was proved many years after his death, when one of his models (the so-called "Langley's folly") was duplicated, equipped with a modern engine, and flown successfully.

EARLY HISTORY OF THE AIRPLANE

Although Langley abandoned his work in despair, he left a fund of knowledge which in other hands gave rise to a successful airplane. The Wright brothers, Wilbur and Orville, after many experiments in which they developed Langley's ideas and their own, on Dec. 17, 1903, succeeded in flying an airplane 59 seconds, near Kitty Hawk, North Carolina. Further work developed an airplane which on Oct. 5, 1905, flew 4½ hours, and the airplane was really "born."

For three years the Wright brothers suspended active operations while securing patent rights. Then in the summer of 1908, Wilbur in France and Orville in the United States, made public flights which focussed the attention of the world upon the airplane. Other inventors, who had been working at the same time, brought out their ideas, and before a year had passed, a number of succesful types were in the field. Notable among these early types were the biplanes of Glenn H. Curtiss in America and of Voisin and Farman in France, and the French monoplanes of Blériot Deperdussin, and of the Nieuport company. This work gave us, not the powerful airplane of today, but practically all the *principles* of the modern airplane. The remainder of the airplane's development has been a matter of working out and refining these principles.

HOW THE AIRPLANE WORKS

The basic principle of the airplane is found by considering the action of a plane driven against the air. Air (*q. v.*) consists of many molecules of gas flying freely about. Although small and unable to resist the passage of powerful organisms like animals, these particles are nevertheless real and able to exert considerable force, as when they all rush in one direction in a wind.

If now we take a plane—a light framework of wood covered with cloth or paper will do—and hold it at an angle against a wind, two things happen. First, the molecules rushing forward in the air strike the under surface, and tend to drive the plane back and up. If we prevent the plane from going back—as we do with a kite by tying a string to it—the only movement resulting from this pressure is upward. Second, the rush of wind past the plane takes molecules from behind and above the plane, thus creating a partial vacuum. In their efforts to press into this vacuum, the molecules below the plane exert an upward pressure, and thus help to support the plane. In a strong wind, these two forces are ample to support a plane, even when it has quite a heavy weight attached to it. The essentials are (1) a wind, and (2) a plane held in the proper position.

These principles explain why the kite flies, the tail being used to keep the "plane" in the proper position. The kite flies by being held stationary, so far as horizontal movement is concerned, against a wind. Since moving a body through motionless air creates the same effect as holding it motionless against a wind, in order to pass from a kite to an airplane, we need only find some way of moving our plane forward through the air, and keeping it in the proper position while moving. The whole problem, then, groups itself under three heads: (1) developing a suitable power plant and means of applying its power to the air so as to keep the airplane in motion; (2) finding means for guiding and controlling the plane in flight; and (3) finding a body form which will present planes at the proper angle and carry all needed parts.

Langley's efforts to fly an airplane were made with a steam engine. Now, a steam engine requires the engine itself, a boiler to make its steam, water, and liquid fuel such as gasoline. The extra load of the boiler and the water required for steam proved too heavy for Langley's models.

The gasoline engine, by eliminating the boiler and water for steam, solved the problem. The remaining problem, so far as power was concerned, was applying the motor's power to the air—and the way for doing this was found in the screw propeller used on steamships. The screw propeller was based on the idea that blades set at an angle about a shaft would screw their way forward through water just as a screw works into wood. By making the propeller large, and moving it rapidly—1500 revolutions a minute or better—the Wrights and others found that the idea would work for airplanes.

Controlling the airplane in flight presents three problems: (1) steering it in horizontal directions; (2) making it go up and down; (3) balancing it in gusts of wind. Extending a light framework to the rear of the plane, planes, and placing a large rudder at the end solved the first problem. Another large rudder, "lying on its side," did for the second. In the earlier models this rudder was placed on

HOW THE KITE BALLOONS WERE USED

Officially, such odd creatures of the air as the one we see here on the right were referred to as "kite balloons," but the men always called them "sausages." Our article on balloons tells you just how they worked. "Of all the captive balloons those of the sausage type proved the most useful. Along every battle line these sausages bobbed in the wind, while observers in their tiny baskets telephoned to their batteries the information they needed to guide the accuracy of their fire. They also reported the movements of the enemy troops and signalled messages to distant points when other means of communication failed . . . To overcome the tendency to 'bob' and 'buck' when held by a ground cable, the sausage balloons were rigged so that they rose in a slanting position."

HOW THE AMERICANS W

From London Sphere. ©New York Herald

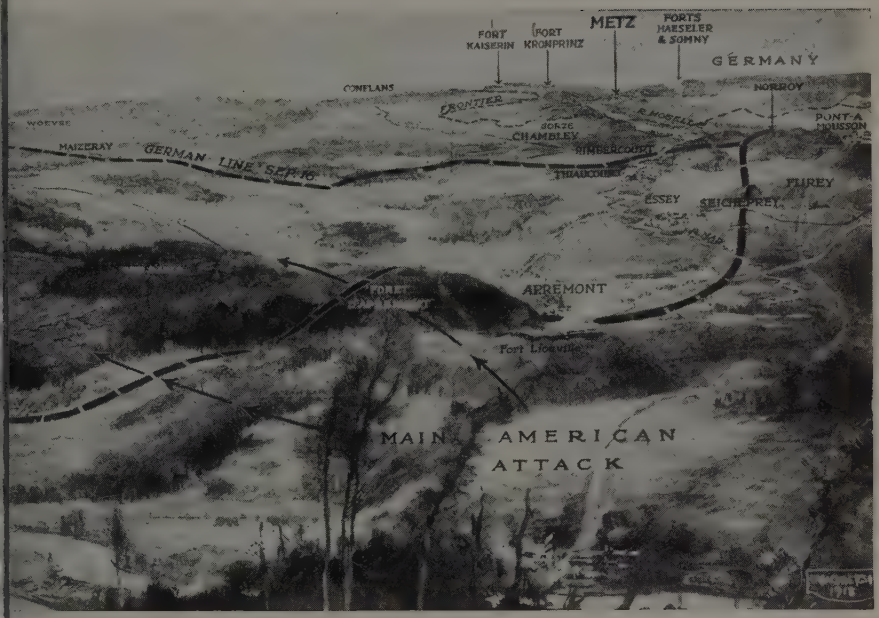
The great victory of the American forces in what is known as the Battle of St. Mihiel was not only an import in relation to the final result of the war, but it was notable as the first battle in which the Americans fought as pendent unit under their own commanders. Up to that time they had assisted the French and British. Here

Loans were subscribed, making the total over 18 billion dollars, not to mention a billion dollars in Thrift and War Savings Stamps bought largely by the school children of the country.

Measures were also taken to conserve the food supply of the United States in order that wheat and other supplies in large quantities might be shipped to aid the peoples in France, Italy, and Great Britain. Herbert Hoover was appointed food administrator, and the enthusiastic way in which people followed the suggestions of the Food Administration showed how thoroughly they believed the slogan "Food will win the war." The production and consumption of coal was also placed under a fuel administrator, Harry A. Garfield, a son of the late President Garfield. Even the clocks were ordered set ahead one hour during the summer by a "daylight saving" measure designed to save fuel and light. The railroads, telegraphs, and telephones were also placed under direct government operation in order that they might be run as economically as possible and to the best advantage for the prosecution of the war. Everything indeed was done to place the United States on an efficient war basis. We realized what the European nations had already discovered, that war today is no longer an affair of armie and navies merely, but of whole nation industrially organized on a vast scale fo combat.

Our preparations were not confined to th territories of the United States. If America troops were to be of the greatest use, ther must be facilities in France to receive them Therefore such seaports as Brest and Bordeau on the western coast of France were practicall turned over to the Americans, who deepene the harbors and built huge docks where mar ships could be unloaded with ease and spee Immense warehouses for storing supplies all sorts were also erected, and an America railroad with connecting branches—in all thousand miles long—was built from th French coast to the sector of the weste front which the American troops were to hol The entire equipment, including rails, ca and engines, was shipped from the Unit States. Many an American soldier labored the broiling sun at this humble work, in ord that the railway might be quickly complet and the army assured of receiving its need supplies. The speed and efficiency with whi these works were constructed was styled the London *Times*, "one of the greate achievements of the war."

BATTLE OF ST. MIHIEL



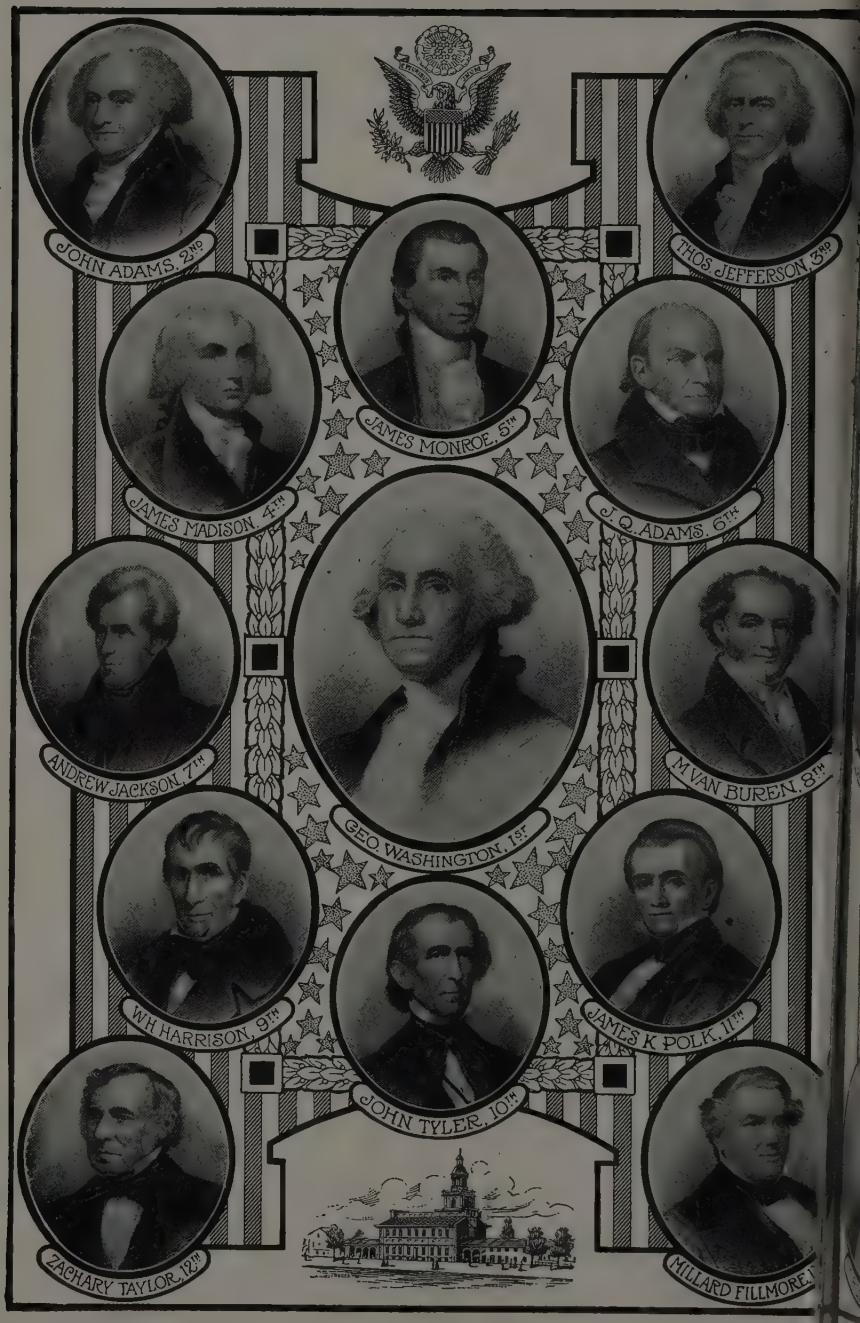
king the main attack in front, while the French are attacking on the flank of the St. Mihiel salient, which, ice the early months of the war had projected like a wedge into the French lines and threatened the French hold tress of Verdun."

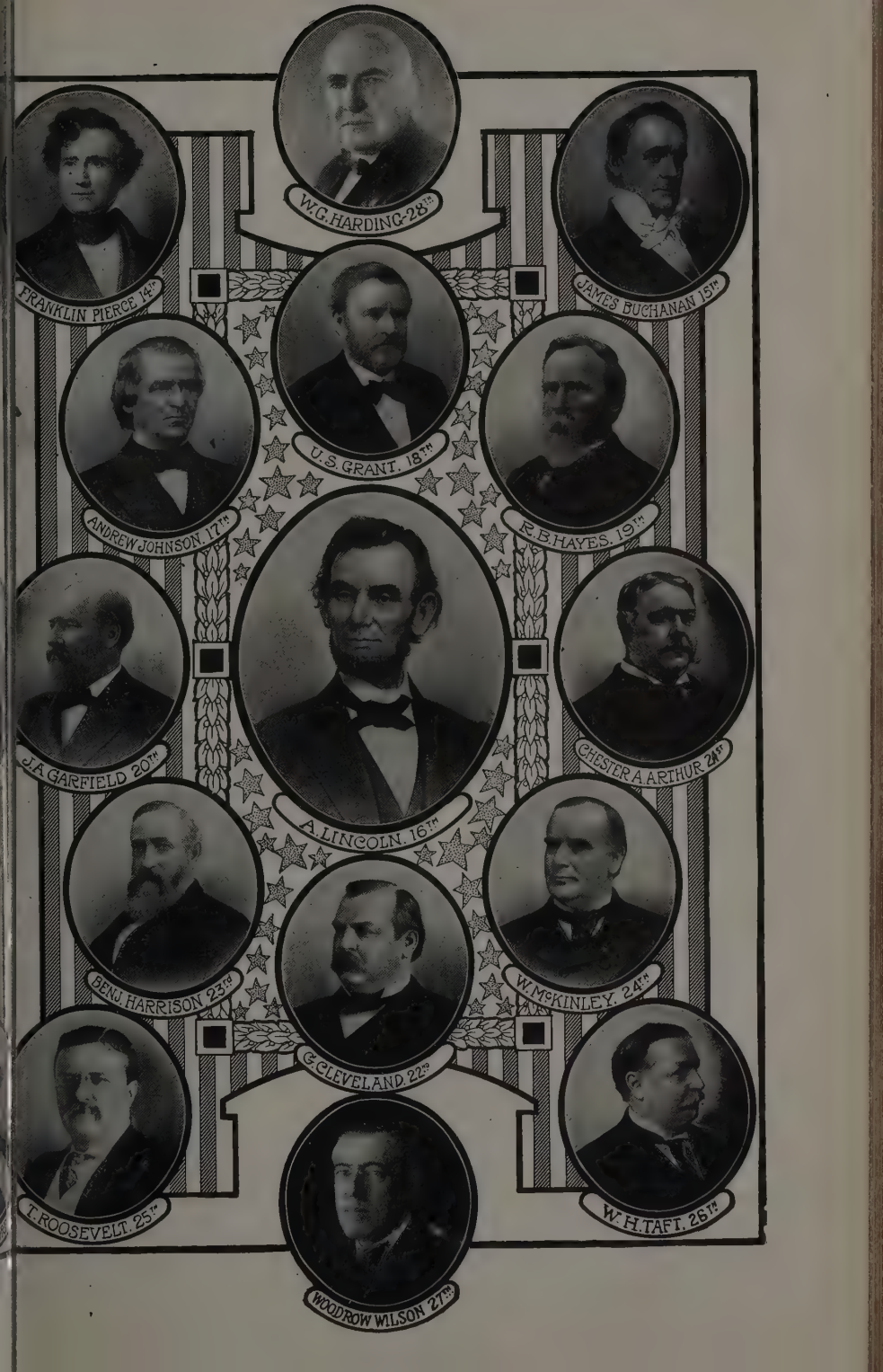
All these preparations would have been in vain without ships to carry the American troops to France. The United States had very few ocean-going vessels at the beginning of the war, and so thoroughly were the treacherous German submarines doing their work at this time that Great Britain and the other Allied nations had few ships to lend us. Our government seized all German and Austrian vessels in American harbors when we declared war, but even so, the supply of available shipping was totally inadequate. So the United States government, through its Shipping Board and Emergency Fleet Corporation, started in on a stupendous ship-building program. Both wooden and steel ships were to be constructed and the existing shipyards were taxed to their capacity. The government built new ship yards, including one at Hog Island near Philadelphia which is the largest in the world. As a result the number of vessels flying the American flag began to increase rapidly. In spite of the terrors of the submarines, it became apparent that the United States would be able to "build a bridge of ships across the Atlantic" to transport and supply our enormous army in France.

More than any other arm of the government, the navy, to which the safety of this transport across the ocean was entrusted, was ready for immediate action when war was declared. A squadron of American war vessels under Admiral Sims was at once sent to reinforce the British fleet. Our destroyers, and smaller vessels known as submarine chasers, proved especially valuable in the search for enemy submarines, and in patroling the coasts. Owing to the long time needed to construct warships, the chief addition made to our navy in the war was in the form of these lighter vessels for patrol and escort purposes.

The first contingent of American troops reached France on June 26, 1917. A few days later General Pershing, who had been selected to command the American Expeditionary Forces in France, arrived in Paris. "You have come, God bless you!" said Marshal Joffre to Pershing as he stepped from the train. On July 4, American troops marched through the streets of Paris amid scenes of indescribable joy on the part of the people. That same day General Pershing laid a wreath of American roses on the tomb of Lafayette, and is reported to have uttered those simple but eloquent words: "Lafayette, we are here" (*Lafayette, nous voila*).

During the first year the number of troops sent to France was necessarily small. Soon


JOHN ADAMS, 2ND
THOS JEFFERSON, 3RD
JAMES MONROE, 5TH
JAMES MADISON, 4TH
J. Q. ADAMS, 6TH
ANDREW JACKSON, 7TH
M VAN BUREN, 8TH
GEO. WASHINGTON, 1ST
W H HARRISON, 9TH
JAMES K POLK, 11TH
JOHN TYLER, 10TH
ZACHARY TAYLOR, 12TH
MILLARD FILLMORE, 1


W.G. HARDING 28TH
FRANKLIN PIERCE 14TH
JAMES BUCHANAN 15TH
U.S. GRANT. 18TH
ANDREW JOHNSON 17TH
R.B. HAYES. 19TH
A. LINCOLN. 16TH
J.A. GARFIELD 20TH
CHESTER A. ARTHUR 21ST
BENJ. HARRISON 23RD
W. McKINLEY. 24TH
G. CLEVELAND. 22ND
T. ROOSEVELT. 25TH
W. H. TAFT. 26TH
WOODROW WILSON 27TH

Story of Lincoln in Art

© *Gutzon Borglum. By Permission of the Artist.*
Lincoln, by Gutzon Borglum (American b. 1867)

© *Horace K. Turner Co., Boston*
Lincoln's Boyhood, by Eastman Johnson (American b. 1824)

THIS page shows how three eminent American artists have told about the life and character of Lincoln. Johnson shows him laying the foundations of his greatness. In the quaint language of Lincoln's cousin, and playmate, Dennis Hanks: "Seems now I never seen Abe after he was twelve 'at he didn't have a book some'rs-'round. A'nt Sairy'd never let the children pester him. She always sed Abe was goin' to be a great man some day an' she w'an't goin' t' have him hendered." This painting is in the library of Berea College, Berea, Ky.

After you study his picture turn to Mrs. Atkinson's biography of Lincoln on page 1073 and you will find a list of some of the books Lincoln read. And there you can read again his immortal Gettysburg's speech and of the simple, quiet way in which it was delivered. The sculptor has caught with his wonderful skill the very spirit of the occasion and the man. This statue is at Lincoln, Neb. French's work is noted for its serenity and distinction and his intense sympathy with his subject.

The work of both French and Borglum has given them a place among the most eminent of modern sculptors. The Lincoln head is in the capitol at Washington. As you look at this face, can you not read the same thought contained in our biography of Lincoln:

"He had the brain of a sage, the forehead of a prophet, the inflexible purpose of the reformer, the tender heart of a mother."

Lincoln at Gettysburg, by D. C. French (American b. 1850)

© *Underwood & Underwood*

PRESIDENT CALVIN C. COOLIDGE

published under the *nom de plume* of Owen Meredith. He is also known as a statesman and diplomat, having filled the offices of governor-general of India (1878–80) and of ambassador to France (1887–91). Lord Robert Lytton was born at London in 1831, and died at Paris in 1891.

Bun'ker Hill, an historic elevation in Charlestown, now a part of Boston, Mass. It is about 100 feet high, and is connected by a ridge with another smaller hill, called Breed's Hill. These hills are where the famous battle of Bunker Hill was fought between the British and American troops, June 17, 1775. The British had possession of Boston, and Generals Howe, Clinton and Burgoyne had just arrived from England with a large body of troops. The American militia and the volunteers were encamped at Cambridge, three miles from Boston. The news had come to the Americans that General Gage was planning to fortify Dorchester Heights, and in order to prevent this 1,000 men under Col. William Prescott were sent to Charlestown on the night of June 16 to fortify Bunker Hill. General Putnam and Major Brooks joined them, and after reaching Bunker Hill without attracting the attention of the British, it was decided to throw up the breastwork on Breed's Hill instead, as it was nearer Boston. At daybreak the British sailors on the ships anchored in the harbor, descried the fortification and began firing upon it. Prescott extended the fortification by filling up with hay the space between two old rail-fences on the left of the breastworks. General Warren came up about two o'clock in the afternoon, and, refusing the command, fought as a volunteer. At the same time Colonel Stark arrived with 500 men and took up a position behind the rail-fence. Meanwhile, the British forces, under Generals Howe and Pigot, had been brought over from Boston in boats, and at half-past two the first charge was made. Prescott had ordered his soldiers not to fire until the British were so near that the whites of their eyes could be seen; and when they did open fire the British retreated in confusion. Meanwhile the town of Charlestown had been set on fire by the hot from the British ships, and, under cover of the dense smoke, Howe ordered a second attack; but again his troops were driven back. Unfortunately the Americans were by this time almost out of ammunition, and when, Clinton having come over with British re-enforcements, a third assault was made, the Americans after firing their last shot and fighting the British bayonets with clubbed muskets were obliged to retreat. The British pursued them only a short distance. The loss of the British was 1,054; that of the Americans being only 450, though among them was General Warren. In the center of the old fortification at Breed's Hill now stands a granite monument, 221 feet in height. The corner stone was laid by Lafayette in 1825, at the fiftieth anniversary of the battle, Daniel Webster delivering one of his greatest orations. It was completed in 1842 and dedicated in the following year, Webster once more being the orator of the day.

Bun'sen (*bōōn'sen*), **Robert Wilhelm,** a distinguished German physicist and chemist, born at Göttingen, March 31, 1811. He received his university training at Göttingen, where he took his doctor's degree at the age of 20. His education was continued at Paris, Berlin and Vienna. At the age of 22 he began, with a privat-docentship at Göttingen, that marvelous career of teacher and investigator destined to extend over more than half a century and to make his name beloved by his own students and a household word for all others. The years from 1851 to 1899 were spent at the University of Heidelberg.

In addition to his more technical chemical investigations, the following may be mentioned as his most important contributions to science:

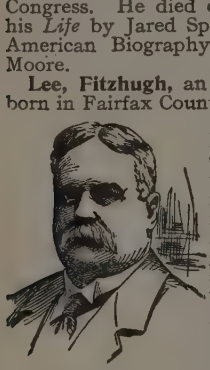
1. The invention of the Bunsen battery which replaced the expensive platinum plate of the Grove cell by a cheap carbon rod.
2. The invention of the Bunsen burner now in use everywhere from the kitchen to the research laboratory.
3. A satisfactory explanation of the phenomenon of the geyser, given after a trip to Iceland in 1847.
4. Precise methods for analyzing gases.
5. The chemical action of light.
6. His well-known ice-calorimeter for measuring quantities of heat.
7. His most important contribution, however, is that which he, in conjunction with Kirchoff, published in 1860 and 1861, namely, the establishment of the foundation of spectrum analysis. These two men showed that the prism is a reliable and delicate method for detecting the presence of any particular element in a chemical compound. And in their second paper they exemplified this fact by the discovery of two new elements, namely, *cæsium* and *rubidium*.

During the last ten years of his life Bunsen was not engaged in active teaching, but held an emeritus professorship at Heidelberg, where he died August 16, 1899.

Bunting, a group of birds between finches and starlings, containing numerous species widely distributed. Among these may be mentioned, as of special interest to our readers, the Snowflake, called Snow-Bunting; the Dickcissel or Black-Throated Bunting; Vesper Sparrow or Bay-Winged Bunting. And mention should be made of the Indigo Bunting, Painted, Varied, Beautiful and Lazuli Buntings. The Bunting is one of the few birds of the Arctics. See SNOWFLAKE AND DICKCISSEL.

dination than before. In 1779 his commission was revoked in consequence of an insulting note to the presiding officer of Congress. He died on Oct. 2, 1782. See his *Life* by Jared Sparks in his Library of American Biography and that by G. H. Moore.

Lee, Fitzhugh, an American soldier, was born in Fairfax County, Va., Nov. 19, 1835.



FITZHUGH LEE

He graduated at West Point in 1856. At the Civil War he entered the Confederate service, advancing to the rank of major-general. In 1885 he was elected governor of Virginia, serving until 1890. He was appointed consul-general to Havana by President Cleveland, and was retained at that post by President McKinley. He cared for the interests of the United States with signal ability during the investigation of the destruction of the *Maine* and throughout the trying times preceding the Spanish-American War. In that war he served as major-general of volunteers, and after peace was declared he was made governor of the province of Havana. He was later appointed brigadier-general in the regular army, retiring in 1901. He died in 1905.

Lee, Henry, a Revolutionary soldier, was born in Virginia, Jan. 29, 1756. He graduated at Princeton College, and in 1776 was appointed a captain of cavalry, and in the following year joined the main army. His vigor and ability attracted the attention of Washington, and his command was soon distinguished for the rapidity of movement and soldierly daring which afterward made Lee's legion so famous and gave him the name of Light-Horse Harry. In 1786 Lee was sent to Congress by the Virginia assembly, and in 1792 he was elected governor of Virginia. As a member of Congress, at the death of Washington in 1799, he was appointed to prepare the eulogy upon the life and character of his dead chieftain. His resolutions contained the often quoted words: "first in war, first in peace and first in the hearts of his countrymen." Lee was in Baltimore in 1814, when the office of *The Federal Republican* was sacked by a mob. He took an active part against them, and with his friends was placed in jail for safe-keeping, but the mob broke into the building and killed or seriously injured all its inmates. Lee never recovered from his injuries, and soon made a voyage to the West Indies in a vain search of health. He died on March 25, 1818.

Lee, Richard Henry, a Revolutionary statesman and orator, was born in Virginia, Jan. 20, 1732. Soon after he was of age he was elected a delegate to the house of burgesses, where his first speech was in opposition to slavery, which he proposed to abolish by placing a heavy tax on all future importation of slaves. In 1767 he spoke against the acts which levied duties upon tea and other articles, and in the following year he suggested private correspondence between the friends of liberty in the different colonies. He is also said to have originated the idea of a congress of the colonies, which was carried into effect in 1774, when the first Continental Congress assembled in Philadelphia. Lee was one of the delegates from Virginia, and took active part in its deliberations, the delegates from other colonies being not only impressed with his great ability and knowledge, but with the "fire and splendor" of his eloquence. He also wrote the address to the people of Great Britain, directed by Congress in 1775, which was one of the strongest state papers of the time. On June 7, 1776, by the instruction of the Virginia house of burgesses he introduced the famous resolutions declaring "that these united colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown." During his long service Lee became a warm supporter of Washington, sustaining him in all the more important acts of his administration. He was popular on account of his liberality and amiable disposition as well as his ardent patriotism. He retired from public life in 1792, and died on June 1, 1794. See *Life* by R. H. Lee.

Lee, Robert Edward, "Marse Robert" as the great military leader of the Confederacy was affectionately called by the people of the south, died five years after the close of the Civil War. He knew the day would come when Blue and Grey would clasp hands above all the graves. Could he have lived until the centenary of his own birth, Jan. 1907, he would have heard his eulogy pronounced by a Massachusetts Adams. He would have seen all parties and a national press united to do honor not only to his genius as one of the great soldiers America has produced, but also to the nobility of his character as a man.

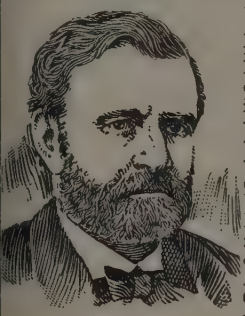
ROBERT EDWARD LEE

Lee was born at Stratford, Westmoreland County, Virginia. His father was Lig

GENERAL R. E. LEE AND HIS WAR-HORSE TRAVELER

Edward Island, and at Halifax, Nova Scotia. In 1872 he accompanied the Canadian engineer, Sir Sandford Fleming, on his overland journey to British Columbia, the result of which was embodied in an entertaining book, entitled *Ocean to Ocean.* In 1877 he became principal of Queen's College, Kingston, Ontario, for the endowment of which he has raised over $400,000, and by his learning and unique personality raised it to a high status among Canadian universities. He served as president of the Royal Society of Canada and as moderator of the general assembly of the Presbyterian church of Canada, and held the degree of LL. D. from Dalhousie and Toronto Universities. His other writings include *Advantages of Imperial Federation, Our National Objects and Aims, The Religions of the World,* etc. A man of powerful personality, marvelous versatility and indomitable perseverance, coupled with deep religious convictions, Principal Grant's death, which occurred in 1902, was a distinct loss, not only to the institution of which he was the head but to the Canadian people at large.

Grant, Ulysses S* When news that Fort Sumter had been fired on was flashed over the wires, in April, 1861, meetings were held in every city and village in the north, and volunteers by thousands offered their services in defense of the Union before President Lincoln issued his first call for troops. At a meeting in Galena, Illinois, a middle-aged clerk in the hardware and leather store of Jesse Grant came forward. Many did not know, until then, that U. S. Grant was a graduate of West Point, that he had served with distinction in the Mexican War and that he had resigned from the regular army with the rank of Captain. His friends urged him to go to Washington and be restored to his old rank, for trained officers were in demand, and his rise would be rapid. It was characteristic of him that he did not think of his own advantage, but organized a company of volunteers and went with it to the state capital. Politics and self-seeking were foreign to his nature. Sheer ability and devotion to duty carried him to the top.



ULYSSES S. GRANT

Born on April 27, 1822, on a farm near Point Pleasant, Ohio, the boy was named Hiram Ulysses. An error in his papers when he entered West Point Military Academy in 1839 dropped the Hiram and substituted Simpson, his mother's maiden name. He reported the error, but it was never corrected. Upon his graduation in 1843 he was sent to Jefferson Barracks, Missouri, and thence to the Mexican War where he won two brevets for gallantry. In 1848 he married Julia B. Dent, the sister of a classmate, in St. Louis, and saw several years' service in California in gold-fever days. In 1854 he resigned and retired to a farm near St. Louis, at the same time opening a real-estate office in the city. Like so many other great men Grant was a failure in business. He got into debt, and was glad to take a place as clerk in his father's store in Galena.

In May, 1861, Grant was appointed Colonel of the Twenty-first Illinois Infantry, and in August he was made brigadier-general of volunteers and given command of southwestern Missouri, with headquarters at Cairo. From the start Grant's policy was strategic and aggressive, qualities which marked his whole career. He at once took possession of Paducah, a move which secured Kentucky to the Union. On Nov. 1 he routed the Confederate garrison at Belmont Mo., a result which checked the advance of a Confederate force under General Price. In Feb., 1862, he captured Fort Henry on the Tennessee and Fort Donelson on the Cumberland, the latter after a three days' siege which resulted in the unconditional surrender of the garrison with 14,000 prisoners. This important victory broke the Confederate lines, and secured Federal control of western Kentucky and Tennessee. Grant was now made major-general of volunteers and given command of western Tennessee. On April 6th he fought the battle of Shiloh (which see), one of the severest engagements of the war. During the summer he fought the minor battles of Iuka and Corinth. He then determined to capture Vicksburg and thus open the Mississippi. The high ground east of the city offered the only favorable point of attack, but failing, after months of effort, to secure a foothold there, Grant transferred his army to the west side of the river and marched through the swamps to a point below the city, while Commodore Porter's fleet of gunboats, with the transports, ran past the Confederate batteries. Again crossing the river 30 miles below Vicksburg, he pushed rapidly between the armies of Johnston and Pemberton, defeating them separately and driving the latter into the defenses of Vicksburg. This stronghold, after a siege of six weeks, was surrendered July 4, 1863, with its garrison of 32,000 men. Grant's next campaign was for the relief of Chattanooga, where the Federal army, beaten at Chickamauga, was besieged and practically cut off from supplies. On Nov. 23rd to 25th the

*As a matter of curious interest U. S Grant Jr. informed the Editor of THE STUDENT's that the S was always written without a period and that while it may have meant "Simpson" it was never so written.

and in making various utensils and implements for household use. They all acknowledge a supreme power, and are much given to a belief in witchcraft, charms and spells. They have wooden images, which they think have power to drive away evil spirits and to protect them from sickness and witchcraft. They are fond of music, and make various musical instruments of simple and rude character. Among the negroes in this country many become skillful in the use of musical instruments, especially the violin and the banjo Since the emancipation of the slaves in this country many individuals have developed an ambition for education and the accumulation of property.

Nehemi'ah, a leader of the Jews after the exile, was a Jew holding the office of cupbearer to Artaxerxes when he heard of the unprosperous condition of Jerusalem. In the following year (444 B. C.) he obtained leave of absence and power to act as governor extraordinary of Judæa, and arriving at the city caused its walls to be rebuilt, enlarged the population by drafts upon surrounding districts and brought back the Levites who had been forced to leave. On his second visit, 12 years later, he began new reforms, notably the movement against mixed marriages, the cleansing of the temple, a strict law of Sabbath observance and a provision for the maintenance of the temple and priests. *The Book of Nehemiah* originally formed the closing chapters of the undivided work, *Chronicles, Ezra and Nehemiah*, containing the memoirs of Ezra and Nehemiah.

Nel'son, in the Kootenay district of British Columbia, is on the south bank of Kootenay River at the head of the rapids. It has 5,273 inhabitants, largely interested in the silver mines and smelters near by.

Nel'son River, a river in Keewatin District of the Canadian Dominion, has its source in Lake Winnipeg, and flows 400 miles northeasterly into Hudson Bay, discharging an immense volume of water. It is navigable for 127 miles from its mouth, but only for 70 or 80 miles for large steamers. Its chief feeder is the Saskatchewan, which empties into Lake Winnipeg.

Nel'son, Horatio. In the rectory of Burnham Thorpe, Norfolk, England, there was born, Sept. 29, 1758, the greatest naval commander of the greatest maritime power in history. Like James Watt, Horatio Nelson was so frail of body that it was not thought probable he would live to maturity. His father's small income as a clergyman and large family, forced the boy out of the home nest. At 12 he was entered as a midshipman in the navy. His maternal uncle, on whose vessel he made his first voyage, thought that the idea of trying to make a sailor out of the delicate, undersized boy was a piece of folly and that the most merciful course would be to discourage him. So, on the first day at sea, he ordered the boy aloft saying: "You are afraid, lad?" "Yes, sir," replied the shivering morsel of a man; "I'm afraid, but I'm going to the top of the mast, sir." And go he did, but he never forgot that sickening experience.

When at 21 he was captain of a frigate, he always raced the new boys up the mast and saluted them at the top. The little fellows frightened half to death but full of British grit, never disappointed him. He abolished the punishments then practiced, saying that cruelty made cowards. He promoted brave men and treated members of the crew with great consideration. As a result his ships were famed for good order and for gallantry in action. To his men he was not an officer but "Our Nel." At Corsica he lost an eye, at Teneriffe an arm. In the battle of Copenhagen he pretended that he was unable to see a signal to retreat, sailed into the thick of the fight and saved the day. When told that, if he had failed, he would have been executed for disobeying orders, —"Oh, no," he replied. "If I had failed, I and my ship and men would all have gone to the bottom." In his naval career of 35 years he never retreated or struck his colors.

As an admiral in command of a fleet he won his first victory in the battle of the Nile Aug. 1, 1798, smashing the French fleet, on which Napoleon in Egypt depended for transport and supplies, so completely that the campaign had to be abandoned. Idol of England at 40, he was raised to the peerage and granted a fortune. Three years later he was made vice-admiral and a viscount. As the shadow of Napoleon lengthened across the English Channel, Lord Nelson's visibly failing health alarmed the country. To have ordered him out would have been inhuman but he came forward voluntarily in May 1803, and offered his remaining days in defense of the empire. There was no one else England had no choice but to accept the sacrifice. For 14 months he lay in the Mediterranean off the port of Toulon. When the French fleet slipped out, he chased it to the West Indies and back; laid siege to it and the allied Spanish fleet in the harbor of Cadiz and brought them both to bay off Cape Trafalgar, October 21, 1805. In going into battle Nelson flew from the masthead of the *Victory* the signal that now is Britain's watchword: "England expects that every man will do his duty."

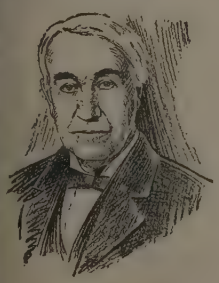
The fleets of the enemy were destroyed but in the hour of triumph the great commander fell mortally wounded on the deck of the flagship. As he lay in a midshipman's bunk, dying, wild cheers rang out, as ship after ship struck its colors or sank beneath the wave.

"England is safe," he murmured, looking up into the face of the officer who bent above him. His simple, loving heart turned like a boy's to his old comrade in arms for the last

xtending up the hills which lie outside the ld town, make Edinburgh one of the most eautiful cities of Europe. It is still repre- ntative of the capital of Scotland. It is he seat of the law-courts and of some of the epartments of government. It is the cen- r of much of the intellectual life of the orthern kingdom, and it has long been nown for its educational institutions. It is ot a manufacturing town to any great xtent, its most important industries being rewing and publishing. It returns four embers to Parliament. Population, 320,- 39. See *Old Edinburgh*, by Drummond nd *Old and New Edinburgh*, by Grant.

Edinburgh University took its origin rom the zeal of the Reformers for education. n 1583 the college was opened. In the 8th century it began to grow. The be- inning of a medical college was made in 724, and in the latter part of the century he fame of the university was greatly ncreased by the reputation of several of s professors, and since then it has become ne of the greatest universities in Great ritain. A students' representative council as founded in 1884, as a means of express- g the opinion of the students on university atters. Goldsmith, Scott, Carlyle and arwin are among the eminent students f the university, and many learned men ave been professors there. There are four epartments, that of arts, of divinity, of w and of medicine. The university-library ntains 150,000 volumes, and there are everal smaller libraries besides. It has 33 professors and 3,200 students. The niversity also has a natural-history mu- um, an anatomical museum and a botanical useum. There are a large number of holarships and fellowships.

Edison, Thomas Alva. To no other man ho ever lived does the term "born invent- or" apply so aptly as to the "Wizard of Menlo Park." Watt and Morse achieved invention by years of patient scientific investigation; Arkwright and Whitney had invention thrust upon them by circumstances; Fulton was an inventor by



THOMAS ALVA EDISON

atural gift, but followed the profession of n artist up to the age of 40. But Edison lived nd breathed in the atmosphere of creation om early boyhood, jeopardized his scant ving for the pure joy of doing his own ork, and was known as the boy-wonder n electricity on Wall Street, New York, soon after he cast his first ballot. It has been said of him that he "kept the path to the patent-office hot with his foot-steps."

The thing that impresses the reader of a life of Edison, first and last, is its joyousness. From babyhood he was the busiest, happiest, most intensely interested in life of any boy in the village of Milan, Ohio, where he was born on February 11, 1847. His father made shingles by hand, and Alva, as he was then called, haunted the shop. But he found the docks along the canal more dramatic, for sometimes as many as five hundred wagon-loads of wheat and corn would be brought in by farmers in one day and loaded on the grain-boats. He watched everything with his big gray eyes, and was not slow about asking questions. A sturdy little "sobersides," his mother called him, too busy to play much with other boys. At home he was a voracious reader, and when the family moved to Port Huron, Michigan, he set himself seriously to work to reading all the books in the public library, a task he wisely abandoned. At 12 he became a business man, and had marked success as a train boy. He sold more newspapers, books and fruit than the other boys, and still had time to print a little newspaper and start a laboratory in one end of the smoking-car. In saving the life of a station-agent's baby he won a friend who taught him the trade of telegraph-operator. He soon became skilful in sending and taking messages, but he had to know how the instrument worked and why, and experimented with an old battery in his father's cellar until he understood it.

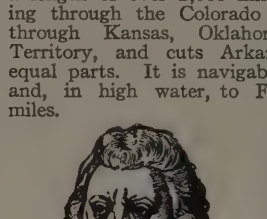
At 15 Edison was in charge of the station at Stratford, Canada, where he was so busy doing his own work that he very nearly caused a wreck on the road and won his discharge. It must be said that he never worked well under orders. He lost positions by his inattention to duty almost as fast as he gained them by ability. His first invention was of a repeater, that would take down the dots and dashes as they came rushing over the wire, and repeat them as slowly as necessary for the operator to write out at his leisure. Then he began to experiment on the problem of sending more than one message at a time over the same wire. He dressed shabbily, and spent all he earned on books and apparatus. He was thought to be an impractical, dreamy fellow, and his employers were often impatient. Thus for five years he led a wandering life, often out of work that would bring in money, but working hard on his own ideas and leading a clean, straight life of the intellect. Pleasures never tempted him. His idea of fun was to be so absorbed that he didn't know if it were night or day. "I owe my success," he has often said, "to the fact that I never had a clock in my workroom."

steadily advancing. The state university located at Fayetteville, has an enrollment of 1,000 students. The law and medical schools, under the control of this institution, are located in Little Rock, and each enrolls about three hundred students. The Branch normal school for negroes is located at Pine Bluff. The leading denominational schools are Henderson College (Methodist) and Ouachita College (Baptist), located at Arkadelphia; Searcy Female Institute and Galloway College (Methodist), located at Searcy; Hendrix College (Methodist) and Central College (Baptist), located at Conway; Arkansas College (Presbyterian), located at Batesville. The Arkansas Military Academy is located at Little Rock. Besides these there are about eighty private academies and high schools. All these institutions enjoy a liberal patronage. There are separate schools for the white and black races, but the laws contemplate that there shall be no difference in the character of the educational facilities offered. In the negro districts the colored race is represented on the school boards, and the attendance is as regular as that of the white schools. Twenty-five per cent of local school expenses are borne by the state and there is a permanent school fund derived from the land grants made to the state by the national government.

History. Possibly the earliest settlement in the state was made in 1686, at Arkansas Post by the French. By the purchase of the Louisiana Territory in 1803, the United States acquired its title to the territory, though it was not till 1824 that the Indian claims were finally adjusted. Arkansas became a territory in 1819 and a state in 1836. It withdrew from the Union in 1861, and was not readmitted till 1868. During the "Carpet Bag" administration the state suffered much, but since the Brooks and Baxter War, occasioned by rival claims to the office of governor, and adoption of the present constitution in 1874, the progress of the state has been marked. Population 1,753,033.

Arkansas City, a city in Cowley County, Southern Kansas, at the junction of the Walnut River with the Arkansas. A canal uniting these two streams furnishes the city with water-power for manufacturing purposes. Settled in 1870, the city was incorporated in the following year. Its trade consists largely of agricultural implements, windmills, wire and mattress factories, flour, oil, lumber mills, etc. The purchasers include the Indian posts and agencies in Oklahoma. The U. S. Indian school is located near here, besides high and primary schools for whites. It is also well furnished with other public buildings, theaters and opera houses. Its trade is served by the Atchison, Topeka & Santa Fe, the Missouri Pacific, the St. Louis & San Francisco Railways. Population 13,000.

Arkansas (*är'kan-saw*), a river of the United States, and, next to the Missouri the longest tributary of the Mississippi It rises in the Rocky Mountains, and ha a length of over 2,000 miles. After breaking through the Colorado cañons, it flow through Kansas, Oklahoma and India Territory, and cuts Arkansas into nearl equal parts. It is navigable to Fort Smit and, in high water, to Fort Gibson, 46 miles.



SIR RICHARD ARKWRIGHT

Arkwright, Si Richard. On stormy night i the year 1765, foot-travele knocked at th door of a thatch ed cottage in th village of Stan hill, Lancashir England, a n asked for shelt from the weat er. The light a candle and t whirring of wheel guided hi to that dwelli rather than to any other of the group. cotton-spinner was there lengthening l day of toil, while his neighbors slept. the knock the candle was blown out and t noise stopped. After a moment a voi asked:

"Who knocks?"

"Dick Arkwright."

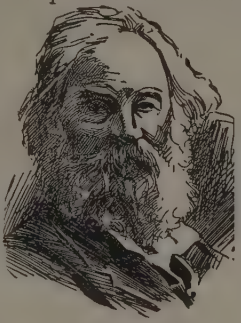
"A spinner?"

"No, a barber and hair buyer from B ton. I can pay for a lodging for the nigh

When the stranger was admitted a the candle had been relighted, there v disclosed a strange spinning-wheel w eight spindles. The host was James H greaves, and this was his newly inven spinning jenny which he used secretly cause his ignorant neighbors, fearing s a machine would make work scarce, l destroyed his first model. In the itiner barber he feared no rival, and he found sympathetic listener. From this cha encounter of two poor, unlettered labo resulted inventions that made England greatest cotton-manufacturing country the world, and revolutionized the meth of the industry.

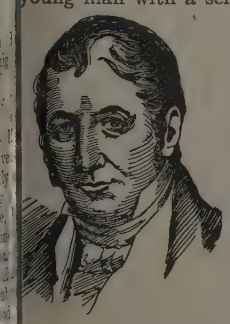
Richard Arkwright was at that t thirty-three years old. He was born Preston, a seaport town north of Liverp in 1732, the youngest of thirteen chil of a poor laborer. At the age of ten was apprenticed to a barber in Bol and for twenty years his life was pa in a cellar shop, shaving workingmen a penny a shave. It is doubtful if he c

eces which made up this book an irregar rhythm took the place of rime and easure. In this e but followed atthew Arnold's *trayed Reveller*, he Old-English oem of *Beowulf* c. Whitman is riously called by s admirers "the et of democracy" d "the good ay poet." Prossor Beers says: He liked the eople — multides of people; the arm of life beld from a Broady omnibus or a Brooklyn ferryboat. The wdy and the negro truck-driver were oser to his sympathy than the gentleman d the scholar." Whitman himself said: sound my barbaric yawp over the roofs the world." During the Civil War he ve himself up to the care of the wounded ldiers in the Washington hospitals, and out this experience he wrote his *Dresser*. *Drum-Taps*, poems on the Civil War, is e of his finest pieces, *My Captain*, written ter the assassination of Abraham Lincoln. 1888 appeared his last volume, *Novem- Boughs*. Whitman made his home in e latter part of his life at Camden, N. J., here he died on March 26, 1892. Consult Edund Clarence Stedman's *Poets of America*.



WALT WHITMAN

Whit'ney, Eli. One fine morning in 1793 young man with a serious, New England type of face, was sitting in his room in a big plantation-house on Savannah River, Georgia, engaged in studying law. A company of rich planters had arrived from Augusta, and were being entertained by the mistress, the widow of General Nathanael Greene (*q.v.*), a hero of the Revolutionary War. So the young man had withdrawn to own quiet quarters. Presently he was errupted by a black servant who said that s. Greene and the gentlemen wished to him in the drawing-room. He went mediately.



ELI WHITNEY

"Gentlemen," said Mrs. Greene, "this my ingenious young friend, Mr. Whitney, o has just been graduated from Yale llege. Explain what you require, and m sure he can help you."

"Will you please invent for us a machine for ginning cotton, and do it as soon as possible? The south has unlimited acres for cotton-growing, and the new inventions in England for spinning and weaving have increased the demand enormously. But there is no use in our growing the cotton so long as the fiber must be separated from the seed by hand."

The man to whom interested people would turn in such an emergency could have been nothing less than remarkable. Eli Whitney was 28 years old. He was born on Dec. 8, 1765, a month later than Robert Fulton. But his birthplace was Westboro, Massachusetts, and his ancestry Puritan. His home was a plain, bare farmhouse; his father a stern, unimaginative man who brought his children up to hard work and few pleasures. Every New England farmer at that time had a workshop, and Eli showed such skill in making and mending the many articles needed in house, stable and field, that the shop was practically turned over to him. One cold Sunday, when sickness kept him home from church, he took his father's silver watch apart and put it together again so well that no one knew it had been meddled with. He mended violins and made nails on a little forge during the Revolutionary War, when the supply from abroad failed. Of course he went to school and learned to read and write and cipher. When he was 19, he set about earning enough money to go to Yale College. But it was a long, hard task, and he was 27 when he graduated. He accepted an offer of a position as a teacher in a private school in the south, intending to use his spare time in the study of law.

On the voyage from New York to Savannah he had the brilliant and wealthy Mrs. Greene for a fellow-passenger, who soon discovered that Eli Whitney was no ordinary young man. So, when he discovered that the position was not what it was represented to be, Mrs. Greene insisted that he be her guest until he could place himself to better advantage. His mechanical skill that had supported him through college was now turned to many services for the gracious lady who had befriended him. Thus it came about that law-books were abandoned, and Eli Whitney won fame as the inventor of the machine that brought wealth to the south.

The problem presented was this: There are two varieties of cotton as of peaches — the freestone and the clingstone. Cotton with the loose seed is easily managed by a simple contrivance, like the clothes-wringer, that presses the seed out. This is the sea-island cotton that grows only near water. The tight-seeded cotton-plant that flourishes inland had to have the fibers pulled from the embedded seeds by hand, a slow and expensive process, even when there were slaves to do the work.

Quito, the capital (80,000), has a university and an institute of sciences, and there are universities in Azuay and Guayas. The principal cities are Quito, Guayaquil and Cuenca. The population is 1,400,000. See *Travels in the Wilds of Ecuador*, by Simson, and *Four Years among Spanish-Americans*, by Hassaurek.

Edda (meaning *great-grandmother*), the name of two very different collections of old Scandinavian literature. The Younger or prose Edda was written between 1050 and 1133, and discovered in 1628. The Elder Edda is a collection of songs, mostly Icelandic. These are 39 poems which sing the praises of old Scandinavian gods and heroes. They belong probably to the 8th and 9th centuries.

Eddy, Mary Baker (1821–1910). Discoverer, founder, and leader of Christian Science. She was born at Bow, near Concord, New Hampshire. Her father, Mark Baker, was a large landholder and well-known citizen. Two of her brothers, Colonel George Sullivan Baker and Honorable Albert Baker, were public men of considerable prominence. The names of several of her ancestors figured in early New England history.

As a girl and young woman, Mrs. Eddy showed an unusual interest in religious subjects, which interest was cultivated by her devout and spiritually minded mother. When twelve years old, she experienced a recovery from illness when her mother bade her turn to God in prayer. The Reverend Enoch Courser, a Congregational minister who was Mrs. Eddy's pastor and tutor for six or seven years, beginning when she was fifteen years old, predicted for her a great future, and spoke of her as an intellectual and spiritual genius. She continued as a member of the Congregational Church until she founded the Church of Christ, Scientist. As an author of poems and as a contributor of articles in newspapers and periodicals, Mrs. Eddy was fairly well known in New England before her discovery of Christian Science.

Mrs. Eddy dated her discovery of Christian Science from 1866, at Lynn, Massachusetts, when she recovered, by divine aid, from the effects of a severe injury. She has briefly related this incident as follows:

"I called for my Bible, and opened it at Matthew ix. 2. As I read, the healing Truth dawned upon my sense; and the result was that I rose, dressed myself, and ever after was in better health than I had before enjoyed. That short experience included a glimpse of the great fact that I have since tried to make plain to others, namely, Life in and of Spirit; this Life being the sole reality of existence." (Miscellaneous Writings, p. 24).

In her autobiography, "Retrospection and Introspection," Mrs. Eddy has more fully related this incident, together with prior and subsequent experiences.

From 1866, Mrs. Eddy devoted herself entirely to the mission she felt she had as the discoverer, founder and leader of Christian Science. She issued the Christian Science textbook, "Science and Health with Key to the Scriptures," in 1875. She founded the Church of Christ, Scientist, in 1879. She established the first Christian Science periodical, The Christian Science Journal, in 1883. Among the last of her important acts, she founded a daily newspaper of international character, The Christian Science Monitor, in 1908. Other books by Mr Eddy are "People's Idea of God" (1886); "Christi Healing" (1886); "Retrospection and Introspection (1891); "Unity of Good" (1891); "Rudimental Divi Science" (1891); "No and Yes" (1891); Church Manu (1895–1910); "Miscellaneous Writings" (1896); "Chri and Christmas" (1897); "Christian Science vers Pantheism" (1898); "Pulpit and Press" (1898); "Messag to The Mother Church" (1900; 1901; 1902); "The Fir Church of Christ, Scientist, and Miscellany" (1913 Consult "Life of Mary Baker Eddy," by Sibyl Wilbur

E'den, the name of the district situate in paradise. It lay in the east in the high lands of Central Asia. Many efforts ha been made to discover just where Ede was, but scholars do not at all agree as t its precise location. The Aryan races, a well as the Hebrews, believed that th human race had its origin in the mountai of Central Asia.

Edgeworth, Maria, English novelist, w born in Oxfordshire, Jan. 1, 1767, and di near Longford, Ireland, May 22, 1849. S began to write fiction early in the 19th ce tury, though she had previously taken interest, with her father, in education topics. Her chief stories, which treat main of the virtues and vices of humanity a have high moral aim, embrace *Popul Tales*, *Moral Tales*, *Castle Rackrent*, *Belin Ormond*, *Tales of Fashionable Life* and *Essay on Irish Bulls*.

Edict of Nantes. See HUGUENOTS.

Ed'inburgh, the capital of Scotland. stands about two miles from the sea on series of ridges, and is overlooked by Arthu Seat and other hills. Arthur's Seat is picturesque hill in Queen's Park, near city, and its name is supposed to go b to King Arthur's time. It rises 822 f above sealevel, and gives a view of gr extent and wonderful beauty. Of the h within the city the most important is Ca Rock. In the beginning of the 7th cent Edinburgh is mentioned as the capital the kingdom of Northumbria, and nar after its king, Edwin. The city was m a borough by Robert Bruce, who gave it the right to establish a port at Le two miles away. During the 15th cent it began to be recognized as the capital Scotland, and Parliament regularly there. In 1544 the city was burned by English. In 1561 Queen Mary came from France, and the tragedy of her reign was acted almost entirely in E burgh. It was at Holyrood Palace that R was killed; in Kirk-of-Field, near w the university now stands, Darnley murdered; and in the chapel of Holy Mary was married to Bothwell. The u of England and Scotland, in 1707, away the Scottish nobility from Edinbu but the Pretender was welcomed there a short time in 1745. Since then the has spread far beyond its ancient w and has become famous as a center scientific and literary activity. Its fine buildings and picturesque situa

Our Discovery Period

In Our Works of Art

©Horace K. Turner Co., Boston — Mural Decoration, Minnesota Capitol

The Mississippi Valley—Its Discoverers and Colonizers, by Edwin H. Blashfield (American b. 1848)

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Landing of Lief Ericson, by Edward Moran (American b. 1829)

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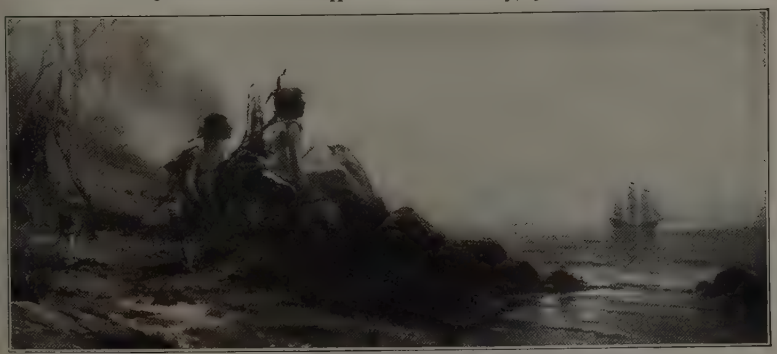
Midnight Mass on the Mississippi Over De Soto's Body, by Edward Moran



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Sir Henry Hudson Entering New York Bay, by Edward Moran

THE DISCOVERER OF THE NORTH POLE

REAR ADMIRAL ROBERT E. PEARY

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HIS HOLINESS, POPE PIUS XI

St. Peter's
Where the Pope Holds Service

ST. PETER'S, where the Pope holds service, is the world's largest and most magnificent church. It stands on the right of the Tiber near the Vatican in a space in the form of an ellipse. From it extend the huge colonnades or covered drives which you see. The dome of the capitol at Washington is copied from the dome of St. Peter's, the erection of which was supervised by Michelangelo.

Now imagine yourself in this wonderful building looking at the group by the famous Spanish painter, Mas y Fondevila, "Worshippers at St. Peter's." With wha skill the artist has brought out th lights and shadows in this vast palac of religion and art and emphasized th motherhood of the church which know no distinction of rank or class. What variety of figures and attitudes—th young Italian mother with her bab one old man with his head bowed up his cane, another, rheumatic and in ra ged shoes holding to the chair to pr vent himself from falling, as he bows worship.

Worshippers in St. Peter's, by Arcadio Mas y Fondevila (Spanish b. 1850)

2. **POETRY:**
   a. **King Arthur, the Holy Grail and the Table Round:** Arthur 114; Grail 790; Idyls of the King 913; Round Table 1638; Tennyson 1891; Bellicent 198; Camelot 314; Excalibur 640; Galahad 729; Ivaine 949; Launfal 1035; Lohengrin 1109; Merlin 1207; Parsifal 2033; Tristram 1943.
   b. **Ossian:** 1397.

3. **MYTHOLOGY:** 1294; Druids 554; Fairy 646; Fenians 654; Mab 1129; Madoc 1142; Puck 1559.

4. **CELTS:** 357; legend 1049; romance 1628.

II. ENGLISH.

GENERAL REFERENCES: 1088-92; England 615; English language 617; Great Britain 728; languages 1028; Ireland 937; Saxons 1685; Scotland 1708; Wales 2034. See, also, Celtic Literature.

1. **EARLIEST WRITINGS:** Alfred 47; alliteration 53; Anglo-Saxon 73; Roger Bacon 154; ballad 161; Bede 190; Beowulf 201; Cædmon 302; Caxton 354; *Domesday Book* 542; English 618; Robin Hood 884.

2. **THE FOURTEENTH CENTURY:**
   a. **Chaucer:** 373; 1088; Becket 189; Canterbury 326; English 618; influence of Italian and French literature 1088; *Assembly of Fowls* and *Canterbury Tales* 373; 1088; 618.
   b. **Wiclif:** 2114; 1088; Bible 210; Vulgate 2030.

3. **THE FIFTEENTH CENTURY:** 1088; Malory 1152; Round Table 1638; Caxton 354.

4. **THE SIXTEENTH CENTURY—RENAISSANCE AND ELIZABETHAN AGE:**
   a. **General References:** 1088-9; drama 550; Elizabeth 611; Bible 210; Coverdale 469; Tindale 1915; essay 626; poetry 1509; sonnet 1781.
   b. **Birth of English Drama:** 1089; Marlowe 1174; Shakespeare 1733.
   c. **Poetry:** 1088; 618.
      (1) **Spenser:** 1796; 1088.
      (2) **Shakespeare:** 1733; 1089; sonnet 1781; *As you Like It* 129; *Hamlet* 831; *King Lear* 1004; *Macbeth* 1130; *Merchant of Venice* 1206; *Midsummer Night's Dream* 1222; *Othello* 1399; Portia 1531; *Romeo and Juliet* 1630; *The Tempest* 1886; *The Winter's Tale* 2097; Stratford-on-Avon 1836.
      (3) **Other Poets:** Beaumont 187; Daniel 1088; Drayton 1088; Fletcher 1089; Greene 1089; Jonson 978, 1089; Peele 1089; Surrey 1851; Sackville 1088; Sidney 1752; Watson 1089, 2055; Wyatt 2114.
   d. **Prose:** Ascham 117; Bacon 154; essay 626; 1089; philosophy 1472; W. Gilbert 766; Hakluyt 825; Hooker 884; Knox 1008; Lyly 1089; Thomas More 1261; 1088; *Utopia* 1996; Raleigh 1583; Sidney 1752; Tindale 1915.

5. **THE SEVENTEENTH CENTURY:**
   a. **Poetry:** 1089; poetry 1509; sonnet 1781; Milton 1228; *Comus* 438; *Paradise Lost* 1418; Puritans 1564; Dryden 555; Cowley 469; Herbert 867; Lovelace 1089; Waller 1089.
   b. **Prose:**
      (1) **General References:** 1089; legend 1048; novel 1363; philosophy 1471; romance 1628; science 1706.
      (2) **Authors:** Baxter 184; Bunyan 290; *Pilgrim's Progress* 1490; Clarendon 404; Hobbes 1089; Leighton 1051; Locke 1106; Newton 1344; Penn 1446; Pepys 1451; Jeremy Taylor 1876; Walton 2040.

6. **THE EIGHTEENTH CENTURY (the Queen Anne Age and the Georgian Era):**
   a. **Poetry:** Pope 1527; Akenside 35; Burns 293; Collins 425; Cowper 470; Gay 741; Goldsmith 778; *Vicar of Wakefield* 2018; Johnson 976;

Hannah More 1261; Ossian 1397; Sheridan 1740; Thomson 1906; Toplady 1924; Watts 2057; Charles Wesley 2068; Young 2125.

b. Prose:

(1) Essays: 626; 1090; Addison 12; Coverley 469; Steele 1820.

(2) Fiction: 1090; novel 1363; romance 1628; Defoe 515; Fieldin 660; Richardson 1611; Smollet 1772; Sterne 1824; Swif 1856; Brobdingnag 272; Lilliput 1071.

(3) History: 1090; 876; Gibbon 764; Hume 897; Robertson 109

(4) Letters: 1058; Chesterfield 378; Junius 982; Lady Montagu 1254; Walpole 2038.

(5) Oratory: Burke 291; Chatham 1495; Curran 487: Erskine 62

(6) Philosophy, Religion and Science: 1090; Berkeley 203; Black stone 223; Butler 1090; Doddridge 537; Paine 1409; Rei 1599; Adam Smith 1769.

THE NINETEENTH CENTURY: 1090-2:

a. Poetry: 1090; Austin 141; Wm. Blake 226; Browning 276; Buchanan 28 Byron 298; Campbell 316; Coleridge 429; *Ancient Mariner* 6 Crabbe 472; Hood 884; Aram 89; Heber 857; Hemans 86 Hunt 899; Keats 994; Keble 994; Landor 1025; Lytton 112 Matthew Arnold 110; Marston 1177; Moore 1260; *Last Ro of Summer* 1033; Morris 1265; Edwin Arnold 110; Patmo 1429; Procter 1551; Rogers 1624; Rosetti 1635; Scott 170 *Lady of the Lake* 1020; *Lay of the Last Minstrel* 10 Lochinvar 1105; Marmion 1174; Shaw 1735; Shelley 17 Cenci 358; Sladen 1765; Southey 1787; Madoc 11 Swinburne 1856; Tennyson 1891; *Grail* 790; *Idyls* 9 *Merlin* 1207; *The Princess* 1548; *Round Table* 1638; Tup 1952; William Watson 2055; Kirke White 2078; Cha Wolfe 2103.

b. Prose:

(1) Fiction: 1091-2; Aguilar 33; Austen 141; Barrie 175; Bayl 1125 *(Lyall);* Besant 207; Black 221; Blackmore 22 Boothby 246; Bronte 272; Dr. Brown 275; *Marjorie Flemi* 1152; T. A. Browne 276; Bulwer 288; Caine 304; Corelli 44 Cotes 463; Dinah Mulock Craik 472; Crockett 479; Church 307; Cross 452; Dickens 529; *Bleak House* 226; *Christm Carol* 395; *The Cricket* 478; *David Copperfield* 452; *Gr Expectations* 799; *Old Curiosity Shop* 1328; *Oliver Twist* 13 *Our Mutual Friend* 1401; *Pickwick Papers* 1438; Disraeli 5 George Eliot 606; *Romola* 1630; *Silas Marner* 17 Farjeon 648; C. W. Gordon 782; Haggard 823; Harrad 842; Hardy 837; Hawkins 850; Hewlett 871; Henty 8 Hughes 894; Ingelow 927; Kingsley 1005; Hypatia 9 Kipling 1006; Le Gallienne 1049; Lever 1059; Mitford 12 Macdonald 1134; Marryat 1176; Meredith 1206; M 519; Gilbert Parker 1423; Jane Porter 1531; Reade 15 Ramée 1584; Quiller-Couch 1574; Clark Russell 16 Leigh Richmond 1612; Olive Schreiner 1704; Scott 17 *Bride of Lammermoor* 265; *Ivanhoe* 949; *Kenilworth* 9 *Rob Roy* 1620; *The Talisman* 1867; Stevenson 1825; Tha eray 1897; Mrs. Ward 2041; Warren 2043; John Wat 2055; Weyman 2072; Yonge 2123; Zangwill 2129.

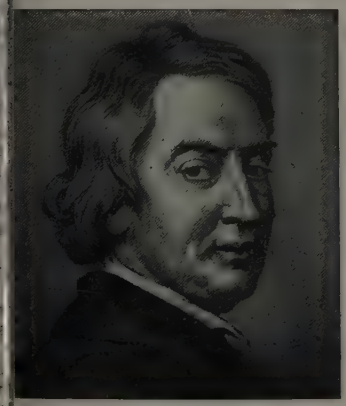
(2) History and Biography: 1091; 876; Allison 50; Arn (Thos.) 110; Bourinot 253; Bruce 281; Buckle 1091; C lyle 1130; Collingwood 1091; Cox 471; Creasy 1091; Cre ton 1091; Cromer 480; Curzon 489; Forster 1091; Freer 712; Froude 721; Gardiner 736; Greene 802; Grote 8 Hallam 827; Harrison 844; Lecky 1044; Lyall 1091; Ma lay 1130; Maine 1151; Martineau 1179; May 1091; Meri 1207; McCarthy 1131; Milman 1228; Napier 1300; Norr 1356; Palgrave 1091; Paul 1091; Petrie 1462; Pollock 1 Prothero 1553; Rawlinson 1589; Rosebery 1634; Row 1091; Sayce 1686; Seeley 1718; Goldwin Smith 1770; S

GEOFFREY CHAUCER

BEN JONSON

SIR PHILLIP SIDNEY

EDMUND SPENSER



JOHN DRYDEN

FRANCIS BACON

GREAT ENGLISH WRITERS PREVIOUS TO THE EIGHTEENTH CENTURY

For portraits of Shakespeare and Milton, see text

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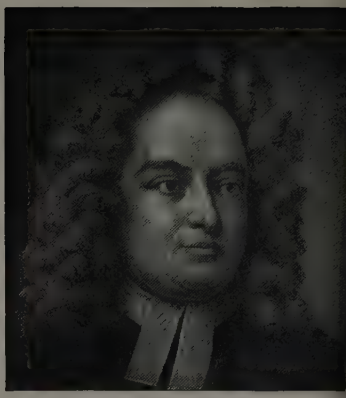
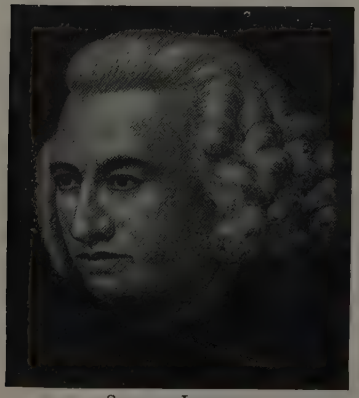
JOSEPH ADDISON



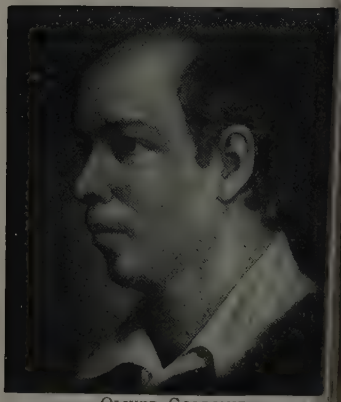
JONATHAN SWIFT

ALEXANDER POPE

ROBERT BURNS



SAMUEL JOHNSON



OLIVER GOLDSMITH

ENGLISH WRITERS OF THE EIGHTEENTH CENTURY

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The Nürnberg Stove (Ramée), *Alice's Adventures in Wonderland* and *Through the Looking Glass* (Carroll), *Black Beauty, Little Lord Fauntleroy* (Burnett), *Being a Boy* (Warner), *The Story of a Bad Boy* (Aldrich), *The Robin Hood Stories* (Pyle), *Tales of a Traveller* (Irving), *King of the Golden River* (Ruskin), *The Water-Babies* (Kingsley), *The Pied Piper of Hamlin* (Browning), *Ten Boys on the Road from Long Ago* (Andrews) and *The Story of the English* (Guerber).

From 11 on, some of the simple biographies are interesting to children, as of John Smith, Boone, Miles Standish, Lincoln, Washington, La Salle, William Penn, Benjamin Franklin, Peter the Great, King Alfred, Cæsar, Cromwell and others.

During the grammar-school period children become interested in such books as *Tales from Shakespeare* (Lamb), Irving's *Stories, Vicar of Wakefield, Pilgrim's Progress, Swiss Family Robinson, Last of the Mohicans, Evangeline, Tales of a Grandfather*, Plutarch's *Lives, Silas Marner, Tom Brown's School-Days*, Franklin's *Autobiography, Uncle Tom's Cabin, Merchant of Venice, Roger de Coverly, Lady of the Lake, Don Quixote, Rob Roy, Treasure Island, Peasant and Prince*, Scudder's *Life of Washington, The Talisman, Ivanhoe* and *The Deserted Village*.

Then comes a large series of books of travel and adventure, geographical descriptions and excursions, stories of hunting and fishing, voyages of exploration and discovery, which make a good share of a library for boys and girls. Such are Livingstone's and Stanley's experiences in Africa, the ocean-explorers, as Columbus, Da Gama, Magellan, Sir Francis Drake and Captain Cook; Arctic explorers, as Nansen; pioneer explorers in America, as Champlain, De Soto, Lewis and Clark and Fremont.

More recently there has come into use a body of nature-stories and science-books which are of much importance, as Burrough's *Birds and Bees, Squirrels and Other Furbearing Animals, Bird Land* (Keyser), *Krag and Johnny Bear* (Seton), *The Foot-Path Way* (Torey), *Three Outdoor Papers* (Higginson), *Stories of Bird Life* (Pearson), *The First Book of Birds* and *Birds Through an Opera Glass* (Olive Thorne Miller), *Nestlings in Forest and Marsh* (Wheelock), *Town Geology* and *Madame How and Lady Why* (Kingsley), *Parland* (Ball), *Natural History of Selborne* (White), *Secrets of the Woods* (Long) and *Familiar Flowers of Field and Garden* (Mathews).

In addition may be mentioned humorous stories, as *How I Killed a Bear* (Warner), *Tom Sawyer and Huckleberry Finn* (Twain), *The Rose and the Ring* (Thackeray), *The Story of a Bad Boy* (Aldrich), *The Adventures of Robin Hood* (Pyle) and *Little Masterpieces of American Wit and Humor* (Masson).

Intelligent parents are becoming aware of the importance of selecting the best books for children and of not only putting these books where children may find them but of reading to the children. Mothers, fathers, older brothers and sisters or aunts cannot entertain and benefit the children so much in any other way as by reading the best stories to them. This should begin before children are old enough to go to school. Between four and six is the choice time, in many respects, to introduce children to the best stories and ballads. Their minds are remarkably receptive to good stories at this period, and the thought and language of children can be thus early shaped and directed into the best channels. Thoughtful mothers who can get time for this delightful study with their children find it most valuable to all concerned and a real pleasure.

As children grow a little older, the reading of good books in the family circle, where old and young alike may enjoy them together, is perhaps the best way of developing the right family spirit and at the same time cultivating and enriching the minds of young and old. For this reason a well-selected family library is very helpful. Some of our city and town libraries now provide a children's room where a full set of children's books is supplied. In some cases a lady is employed to read to classes of boys and girls, introducing them in an interesting way to the better class of books.

In common schools the entire method of treating books and literature has undergone a great change in recent years. The oral treatment of stories in primary grades has developed into an elaborate plan of introducing the best stories and literary products to children, in order thus to give them an early and vivid acquaintance with authors and their works. Primary teachers have been developing the art of *storytelling*, including clear and attractive narrative, impersonation of characters, dramatic action of a simple kind, question, answer and discussion and, finally, careful reproduction of stories by the children. This kind of work has vitalized primary instruction, awakened the interests and thought activity of children, and exerted excellent influence in improving the language and composition of pupils. It has laid the foundation in primary grades for a real educative acquaintance with several standard classes of literature which may grow and develop later. This oral acquaintance with firstclass stories and myths also has a close relation to the labor of learning to read in primary schools. It plants in the children the desire to learn the art of reading, and it lends enthusiasm and natural expression to all later oral reading. The mechanical formalism and monotony so common among children in learning to read are due largely to the lack of thought and interest in what they are reading; in short to a deficiency of such stimulating ideas as children appropriate richly through oral story and work.

write a line of it, writing first for the stage — about 13 dramas, which nobody would play." Apart from his numerous quarrels and lawsuits, his life after 1852 is a record of the production of plays and novels. By the former he generally lost money, and by the latter secured both money and fame; for, in spite of all his peculiarities and defects, he showed himself a story-teller of rare gifts and powers. Among his novels are *Hard Cash, Never Too Late to Mend, Put Yourself in His Place* and *The Cloister and the Hearth*. He died at Shepherd's Bush, London, April 11, 1884, his last years clouded by sorrow and ill-health. See *Memoir* by Compton Reade.

READING: PRE-SCHOOL AGE

How Mothers May Teach Their Children at Home

by

Mrs. Winifred Sackville Stoner

Founder and Director of the International Natural Education Association

Of the so-called Three R's, reading is the most important in giving the child an educational foundation. A mother cannot begin too early in providing her child with the *open sesame* to knowledge. The best knowledge of all ages is in books, and when young children are taught to read, and good books are placed in their environment, they read not only for amusement but for information.

I believe in equipping children early in life with tools that help them gain knowledge, and that is why I taught my daughter, Winifred Sackville Stoner, Jr., how to read when she was but seventeen months of age.

There are educators who will warn parents against injuring children's eyes through early acquisition of the reading art; on the other hand, muscles are improved by exercise as long as they are not strained. There can be no strain through the Natural Education Method of learning to read via the typewriter and books printed in large type. At the same time the child learns to play to a purpose and gains co-ordination of mind and muscle.

Teaching Rreading Through Environment. As environment is the architect of children's lives, make your nursery walls into teachers. Cut large capital letters out of red cardboard and make a frieze for the nursery wall. Use red because young children prefer this color to any other.

When buying balloons, select those that are lettered. Use a lettered ball, table, and plate for the child's food. Equip the nursery with a box of anagrams, a box containing both rough and smooth letters, a box of colored sticks (curved and straight), plasticine out of which to form letters, a train of cars made out of small powder boxes each marked with a special letter from A to Z, crayons to draw letters, and place a Chautauqua industrial art desk upon a low table. On the desk place a portable typewriter with a standard keyboard and single shift. These tools are helpful in teaching little folks to read.

Do not try to teach your child the entire alphabet at one time, but interest him in the sounds of the letters by singing to the air of "Twinkle, Twinkle, Little Star":

ABCDEFG (form *G* with hands)
H I J K L M N O P (form *P*)
Q R S T U V (form *V*)
W X Y Z—I'm as happy as can be
Because I know my A-B-C

I am opposed to singing Mother Goose jingles because these nonsensical rhymes teach nothing worth while and often give wrong impressions of morals, table manners and the English language. If you will sing jingles like the above, the children will gain knowledge while they are singing. The mother should point to the letters as she sings.

Some teachers believe that children should be taught words as a whole rather than to learn the letters first and then build words. Children who do not know the letters forming words are rarely good spellers. The child who learns to build words learns also to spell.

In teaching one letter at a time begin with A. Show Tommy letter *A* on the wall, on his blocks, ball, table, plate, desk, etc. Then give him a box of anagrams and ask him to look the *A* box car of his train with letter *A*. Help him find *A's* and then see if he can do without aid. On the following day ask him to bring to you block *A* and you will then discover whether your training has placed *A* in the sub-conscious reservoir of knowledge that will remain with him through life. Then draw a letter *A* on white paper with a red crayon, make *A* with sticks, and form it out of plasticine, encouraging Tommy to do likewise.

In the same way teach him how to recognize the other letters. But long before you have reached *Z* you can show him how to put letters together in the *AT, ET, IT, OT, UT,* etc. families. He can learn how to spell *C-A-T* by using a picture of a cat and his blocks as anagrams. Afterwards he can learn to spell all of the words in the *AT* family—*bat, cat, fat, gat, hat, mat, nat, pat, rat, sat, tat, vat.*

After learning words in different word families the child will enjoy looking for the word friends in books, street cars, etc., and thus he will gain the reading art. A jingle like "The House That Jack Built" is helpful in teaching reading because the words are repeated, but the subject matter is not educational. Mothers can make simple reading lessons concerning objects in the model home, writing the lessons on the typewriter.

Let us take BREAD for our reading subject.

Here is the bread that Ann baked
Here is the flour used in the bread that Ann baked
Here is the wheat that made the flour—
Here is the lad who sowed the wheat—

DO YOU MISUSE OR CONFUSE SOME OF THESE COMMON WORDS?

How many of the words in this list do you misuse? A great many persons do not use all of them correctly. This is a very carefully selected list, and contains the principal errors of diction, or use of words. You will probably find that you will be greatly benefited by noting the correct uses given. When you can use these words correctly, you have mastered many errors which are made thoughtlessly by some educated, and unknowingly by uneducated persons. Many of these words are frequently misspelled; so note the spelling closely also.

Accept, except. *Accept* means *to receive; except, to reject.*

Advice, advise. *Advice* is a noun, *advise* a verb. He *advised* him; and the *advice* was well taken.

Affect, effect. *Affect* means *to influence somewhat. Effect* means *to work a complete change.* As a noun, *effect* means *result.* The water *affected* my ears. The lawyer *effected* the release of the prisoner.

Affectation, affection. *Affectation* means *pretence; affection* means *love.*

Aggravate. This word means *to make worse.* It is wrongly used in the sense of *annoy.* Wrong: His teasing *aggravated* me. Right: The disease was *aggravated* by improper treatment.

Ain't. Improper always. *Isn't* means *is not; aren't* means *are not.* There is no proper contraction for *am not.*

Altar, alter. *Altar* is a certain piece of church furniture. *Alter* means *change.*

Alot of. It is better to say *many,* or *much.* Many men. Much work. Do not use *a lot of.*

Aloud. Much better than *out loud.*

Allusion, illusion. *Allusion* means a *reference to; illusion* means a *false vision.* He *alluded* to the *illusion.*

Ally, alley. *Ally* is a *companion. Alley* is a *narrow street.*

Already, all ready. *Already* means *at present,* or *at a past time. All ready* means *completely ready. Already* the band had passed the corner. The band was *all ready* to play.

Alright. There is no such word. Use *all right.*

Amount, number. *Amount* means *mass* as a whole. *Number* refers to individuals. The *amount* of traffic is appalling. The *number* of vehicles is very large.

And etc. Wrong. *Etc.* is the abbreviation for the Latin words *et cetera, et* meaning *and,* and *cetera so forth.* Thus *etc.* in itself means *and so forth.*

Anecdote, antidote. *Anecdote* means a *short story* or *incident.* An *antidote* is something which will *counteract a poison.*

Anxious. This word does not mean *eager. Anxious* carries the idea of *serious concern.* I am *eager* to go. I am *anxious* concerning his safety.

Anybody else's, anybody's else. Both correct. First preferred.

As—as. So—as. Use the first when no negative is expressed. I am *as* tired *as* he is. Use the second with the negative. I am *not so* tired *as* he is.

Auto. This abbreviation is not in good form.

Ways. Incorrect, since *a* is singular and *ways* plural. Say, I am *a* long *way* from home.

Awful, terrible. *Awful* means *filled with awe.* It does not mean *terrible.* Do not use *awful* to express *extremely.* I am *extremely* worried. It was an *awful* sight (meaning that the sight filled one with awe, or the hushed wonder).

Balance. It is better not to use *balance* in the sense of *rest* or *remainder.* Use it to suggest *equality* or *equilibrium.* Right: The *remainder* of the day. Poor: The *balance* of the day. Good: The *balance* of power among the nations was maintained.

Because. Do not use *because* for *the fact that.* Wrong: *Because* he is going is no reason I should go. Right: *The fact that* he is going is no reason I should go. Right: I am going *because* he is going.

Beg. Use when you wish to express honest regret, or solicitation. Do not use in the trite expression, *I beg to remain, yours truly.*

Begin, start, commence. Distinguish among these words carefully. Correct uses are here given. I *started* to school. I *began* practising for the hurdles. The program *commences* at eight o'clock.

Beside, besides. *Beside* means *at the side of. Besides* means *moreover. Besides,* the dog was *beside* me.

Better, best. More, most, etc. The comparatives, *better, more* are used when comparing *two* objects. *Best* and *most* are superlatives, and are used when *three* or more objects are under consideration. John is a *better* student than I. John is the *best* student in the class. *More* persons live in New York than in Chicago. *Most* of the cotton produced on earth is grown in the Southern States.

Between, among. *Between* requires *two* objects only. *Among* requires *three* or more. Between New York and *San Francisco.* Among the various cities. *Between,* since it is a preposition, takes the objective case. *Between him* and *me.* Wrong: *between he* and *I.*

Blame it on. This is a poor expression. Faulty: He *blamed it on* me. Right: He *blamed me* for it.

Bridal, bridle. *Bridal* refers to a *bride. Bridle* is a *part of a harness.*

Broadcasted. Both the past and the past perfect forms of the word are the same: broadcast. So *broadcasted* is not necessary at all. He *broadcast* the message. He *had broadcast* the message. The message was *broadcast.* Poor: He had *broadcasted* the message. Poor: The message was *broadcasted.*

Burst. Like *broadcast,* burst is the past and past participle form. There is no word *bursted.* Neither is *busted* in good form. Right: The boiler *burst.* Wrong: The boiler *busted* (*bursted*).

But what. As a rule, you should use *but that.* Wrong: I do not know *but what* he is here. Right: I do not know *but that* he is here. *But what* is correct if you can substitute *but that which.* Right: I can do nothing *but what* (*that which*) is right.

Can, may. *Can* denotes *ability. May* denotes permission. *I can go* means that you are physically able to go. *I may go* means that you have permission to go.

Cannon, canon, canyon, cañon. *Cannon* is a gun. *Canon* is a church official. *Canyon* is a deep cut in a mountain made by a stream. Cañon is a foreign form of canyon, and is sometimes used in southwestern United States, where the Spanish language once gained a foot-hold.

Capital, capitol. *Capital* denotes a sum of money, a chief thing of its kind; and is used to designate the seat of government. *Capitol* refers to the chief governmental buildings. Washington, the capital of the United States, contains the capitol (building).

Cannot help but. This expression is wrong. It is a mixture of two correct phrases. Right: I *cannot but go.* Right: I *cannot help going.* Wrong: I *cannot help but* go.

Can't hardly. Wrong. *Can't* means *can not. Hardly* means *with difficulty.* Right: I *can hardly* go. Right: I *can't* go. Wrong: I *can't hardly* go.

Canvas, canvass. *Canvas* is a cloth. *Canvass* means *to solicit.*

Cite, sight, site. *Cite* means *to offer as an example or evidence. Sight* means *view;* it also is one of the five senses. *Site* means *a specific location.* He *cited* the case of Jones vs. Jones. It was a pretty *sight* (view). His *sight* was impaired. I shall build my house on this *site.*

Claim, maintain. These words do not convey the same idea. *Claim* means *to assert a right over what is one's own. Maintain* means merely *to assert.* He *claimed* his book. He *maintained* that he was right in his assertion.

Cloths, clothes. *Cloths* is the plural of *cloth. Clothes* means *garments.* He showed me several *cloths* (kinds of cloth). Put on your *clothes.*

Complected. This word is not in good standing. Say *complectioned* instead.

Conscience, conscious. *Conscience* refers to one's *moral sense. Conscious* means one is *aware* of a condition or fact.

Could of. Wrong. Say *could have.*

COMBINATIONS WHICH CUSTOM HAS ESTABLISHED FOR US

A careful speaker or writer will use the indicated prepositions with the words listed below. The combinations are idiomatic; that is, they have been established by custom, and should no more be violated than good manners. Correct usage will assist your development in every way.

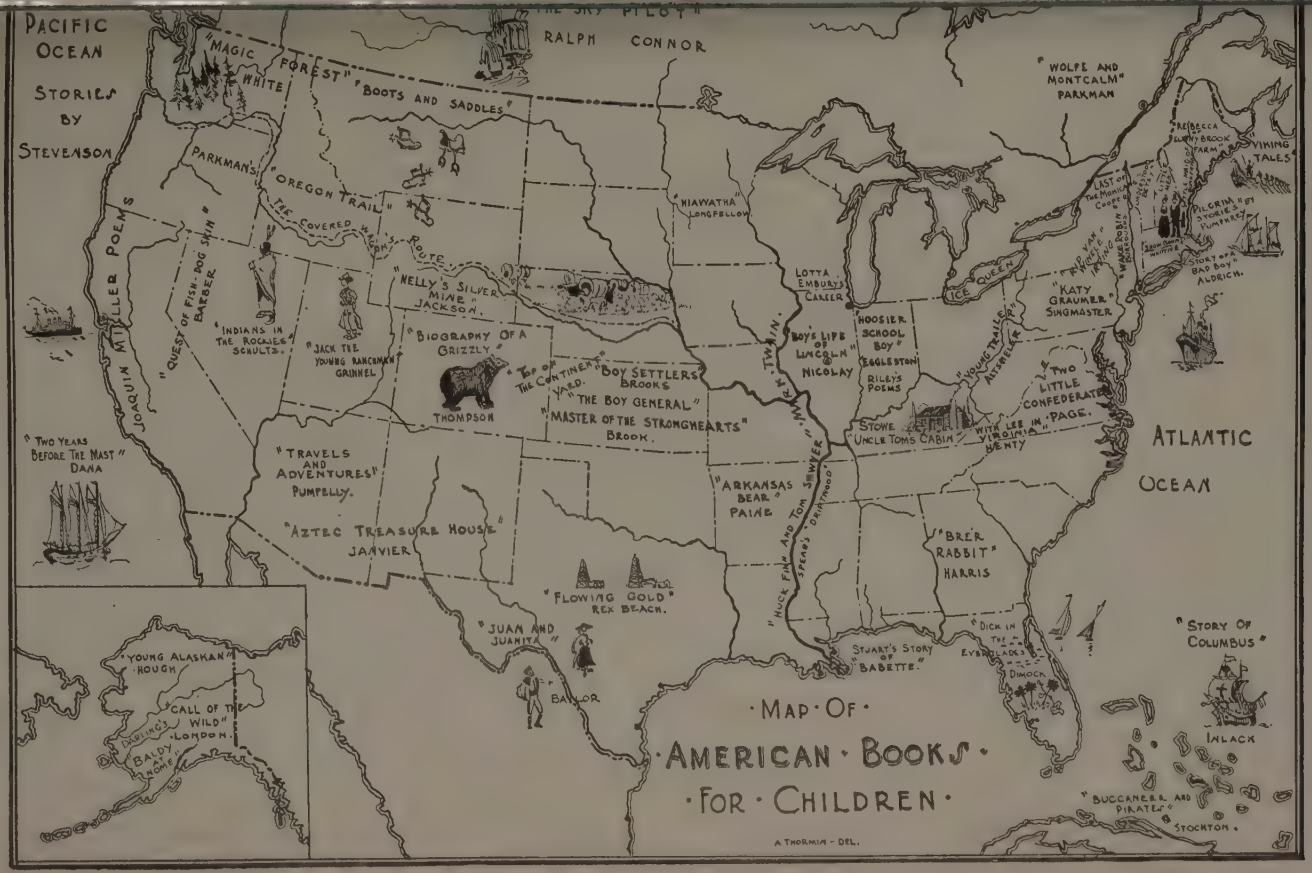
agree *to* (a proposition)
agree *with* (a person)
agreeable *to* (not *with*)
angry *at* (a condition)
angry *with* (a person)
attend *to* (something)
attend *upon* (a person)
careful *about* (a situation)
careful *of* (your money)
compare *with* (for contrast)
compare *to* (for resemblance)
comply *with* (not *to*)
convenient *for* (use)
convenient *to* (a person)
correspond *to* (an object)
correspond *with* (a person)
deal *in* (things)
deal *with* (a person)
differ *from* (other objects)
differ *with* (a person)
different *from* (not *than*)
dissent *from*
enamored *of* (not *with*)
entrust *to* (a person)
exception *to* (not *at* or *with*)
free *from* (not *of*)
independent *of* (not *from*)
inferior *to*
in search *of* (not *for*)
insist *upon*
listen *to* (not *at*)
mindful *of* (not *for*)
part *from* (a person)
part *with* (a thing)
pleased *with* (not *at*)
possessed *of* ability (not *with*)
prejudice *against*
prevail *upon* or *over*
reconcile *to* (a person)
reconcile *with* (a condition)
resemblance *to*
resolve *on*
the Reverend Mr. — (not Rev. —)
try *to* do a thing (not try *and* do a thing)
wait *for* (an occurrence)
wait *upon* (a person)

THREE HUNDRED NINETY-THREE DEMONS OF OUR LANGUAGE

Spelling will not be very difficult for one who carefully studies the more difficult words. O English language contains about half a million words—four times as many as the nearest numeric competitor, the German. Of course, every person uses only a few thousand words. Shakespea who used more than any other writer of English, used 15,000.

The carefully selected list which follows contains the common words frequently misspell In whatever walk of life you may pursue, spelling is important, for this is the age of the writt word. This list will be of the greatest value to the young person, because it contains the comm words often misspelled. In studying this list, remember to study the "misused or confuse list also given.

ache
absence
absorption
acceptable
accessible
accidentally
accommodate
accumulate
accustom
acknowledgment
acquainted
acquitted
across
addressed
adviser
aeroplane
again
allotted
all right
altogether
always
among
analysis
analyze*
angel
angle
annual
answer
anxiety
anxious
any
apparatus
appearance
arctic
argument
arise
arrangement
arrival
ascend
athletic
audience
auxiliary
awkward
baring
(making bare)
barring
(prohibiting)
based
becoming
beggar
beginning
believing
benefited
biscuit
blue
(color)
blew
boundary
brake
(stop by friction)
break
Britain
built
buoyant
bureau
business
busy
buy
calendar
candidate
can't
cemetery
(graveyard)
(seminary, or school)
changeable
changing
characteristic
chauffeur
column
coming
comma
commission
committee
comparative
comparison
compel (lled)
competent
concede
conceivable
conferred
conqueror
conscience
conscientious
considered
control (lled)
co-operate
cough
country
courteous
courtesy
cylinder
dear
deer
(animal)
deceitful
decide
decision
deferred
definite
deceased
descend
describe
despair
desperate
develop
development
dictionary
difference
dilemma
dining room
dinning
(noise)
disappear
disappoint
disease
dissatisfied
dissipate
divide
divine
doctor
does
done
don't
drudgery
dying
early
easy
ecstasy
eighth
eliminate
embarrass
encouraging
endorsed
enough
equipped
especially
etc.
every
exaggerate
excellent
except
exhaust
exhilarate
existence
expense
experience
explanation
familiar
fascinate
February


PACIFIC OCEAN
STORIES BY STEVENSON
"MAGIC FOREST" WHITE
"BOOTS AND SADDLES"
PARKMANS "OREGON TRAIL"
THE COVERED WAGON
"QUEST OF FISH-DOG SKIN"
JOAQUIN MILLER POEMS
"INDIANS IN THE ROCKIES" SCHULTZ
"JACK THE YOUNG RANCHMAN" GRINNEL
"NELLY'S SILVER MINE" JACKSON
"BIOGRAPHY OF A GRIZZLY" THOMPSON
"TWO YEARS BEFORE THE MAST" DANA
"TRAVELS AND ADVENTURES" PUMPELLY
"AZTEC TREASURE HOUSE" JANVIER
"FLOWING GOLD" REX BEACH
"JUAN AND JUANITA"
"YOUNG ALASKAN" HOUGH
"CALL OF THE WILD" LONDON
DARLING'S BALDY HOME
"THE SKY PILOT" RALPH CONNOR
"HIAWATHA" LONGFELLOW
"WOLFE AND MONTCALM" PARKMAN
LOTTA EMBURY'S CAREER
"BOY'S LIFE OF LINCOLN" NICOLAY
HOOSIER SCHOOL BOY
EGGLESTON
RILEY'S POEMS
"BOY SETTLERS" BROOKS
"THE BOY GENERAL"
"MASTER OF THE STRONGHEARTS" BROOK
"ARKANSAS BEAR" PAINE
"BRER RABBIT" HARRIS
"HUCK FINN AND TOM SAWYER" SPEAD DRUMMOND
STUART'S STORY OF BABETTE
"DICK IN THE EVERGLADES" DIMOCK
"REBECCA" SUNNY BROOK FARM
"VIKING TALES"
"LAST OF THE MOHICANS" COOPER
"PILGRIM'S PROGRESS"
"STORY OF A BAD BOY" ALDRICH
ICE QUEEN
"KATY GRAUMER" SINGMASTER
"YOUNG TRAILERS" ALTSHELER
STOWE UNCLE TOMS CABIN
"TWO LITTLE CONFEDERATES" PAGE
WITH LEE IN VIRGINIA HENTY
ATLANTIC OCEAN
"STORY OF COLUMBUS"
INLACK
"BUCCANEERS AND PIRATES" STOCKTON
MAP OF AMERICAN BOOKS FOR CHILDREN
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1092b

ter and three and a half at the posts that support its ends. The court is 78 by 27 feet in area when two people play, but 78 feet long and 36 wide when four play. The object is for one player on one side of the net to knock the ball into the other players' part of the court in such a way that it cannot be returned. The racket consists of a tightly-strung, flat net of gut; the balls, of rubber thinly covered with white flannel or felt. White lines are traced on the court to indicate the base-lines, each 39 feet from the net; the side-lines 78 feet long, connecting the base-lines; the service-lines, each 21 feet from the net; and the half-court line, half-way between the side-lines, parallel to them and dividing the space on each side of the net into the right court and the left court. So the whole court consists of two half-courts, and these each of a right and a left court. One player takes the ball, stands with one foot on the base-line, the other behind, throws the ball into the air and strikes it in order to drive it, not into the opposite court, but into the court *diagonally* opposite. The other player must hit it on the first bound and return it into the first player's territory. If he does not, the first player, called the server, scores a point which is counted as 15. But if this second player, called the striker-out, return the ball to the server and *he* fail to return it again, the striker-out scores 15. In this way the game goes on under rules of its own, the second point for either player making the score 30, the third 40, and the fourth winning the game, unless *each* player has scored 40. In this case the score is called deuce, and *two* points must be *consecutively* scored for winning the game. When either player has won six games consecutively, a set has been played. But if each has won *five*, the set is deuce and *two* consecutive games must now be won. Serving the ball is done by each player in turn, but courts are exchanged between them only at the end of a set. Three or four players play essentially as do two.

Ten'nyson, Alfred, an English poet, was born at Somersby, Lincolnshire, Aug. 6, 1809. At Trinity College, Cambridge, where he studied, he gained a medal for a poem called *Timbuctoo*. His first publication, *Poems by Two Brothers*, was written in connection with his brother Charles, and so great an authority as Coleridge pronounced only the poems marked C. T. to have marks of poetical genius. A volume containing *The May-Queen*, *Mariana*, *A Dream of Fair Women* and *The Lotus-Eaters*, was followed by another collection, which included *Locksley Hall*, *Morte d'Arthur*, *St. Simon Stylites* and *Ulysses*, and from that time Tennyson easily held his place as the first of modern English poets. His great work, *In Memoriam*, is a series of poems on death, immortality and kindred themes, suggested by the loss of Arthur Hallam, his friend. It was first published without Tennyson's name in 185[illegible]. The *Ode on the Death of the Duke of Wellington* and *The Charge of the Light Brigade* one of his most popular poems were written as poet-laureate. The position which he succeeded Wordsworth in November, 1843. *Maud*, published in 1855, was longer

LORD TENNYSON

winning public favor than most of Tennyson's work, but the *Idyls of the King* (*q. v.*) met with an enthusiastic reception. The first series consists of four stories in verse: *Enid*, *Vivien*, *Elaine* and *Guinevere*, to which a second series was added which included *The Holy Grail*, *Gareth and Lynette*, *Pelleas and Etarre*, *The Last Tournament* and *The Passing of Arthur*. They are the consummate form into which one of the greatest poets of the 19th century wrought those Arthurian legends which have haunted English romance for 700 years. *Enoch Arden* appeared in 1864 *Queen Mary* in 1875; *Harold* in 1876; *Becket* in 1884; *Demeter and other Poems* in 1889. Tennyson lived a retired life, spending a large part of his time at his place on the Isle of Wight. He wrote carefully, altering and improving his poems, until they attained the perfect form in which they were given to the public. He received large sums of money for his later work, in some instances being paid as much as $50 a line. His poems have been translated into German and Spanish. In 1883 he was made a peer. He died at Aldworth, in Surrey, England, Oct. 6, 1892. One of his last poems, *Crossing the Bar*, was used in the services at his burial in the poets' corner of Westminster Abbey. Consult Hallam Tennyson's *Alfred, Lord Tennyson;* Stedman's *Victorian Poets* and Frederic Harrison's *Tennyson, Ruskin and Browning*.

Terence (*tĕr'ĕns*), **Publius Terentius Afer,** a Latin poet, was born at Carthage about 195 B. C. He was a freed slave, and was educated by his master, a Roman senator. His first play, *Andria*, was brought out in 166 B. C., and was so successful that he had the best young men of Rome for friends. When in Greece he translated six of Menander's comedies, and his death is commonly thought to have been due to grief at the loss of his translations. He left six comedies: *The Woman of Andros*, *The Stepmother*, *The Self-Tormentor*,

brary of Craigie House, and said: "He as a beautiful soul."

No more fitting epitaph could be inribed on Longfellow's monument. He as a beautiful soul, and his poetry was a flection of the goodness, sincerity and urity of his mind and heart. The man ho was to win so unique a place in the ffections of men was the natural product an unspoiled New England. He was rn in Portland, Maine, Feb. 27, 1807.

HENRY WADSWORTH LONGFELLOW

ettled in 1632, Portland still retained uch of its Puritan character in the simicity of living and democracy of society. o one was either very rich or very poor. ood morals and propriety were expected; perior education and manners inspired spect. Imagination was given wider nge in this busy seaport town than in e interior by the arrival and departure sailing vessels in the foreign trade. In *y Lost Youth* the poet shows how early life these things exercised their fascinon on him. Upon his graduation from owdoin College, Maine, at 18, the way to literary life was opened by the offer of a rofessorship in modern languages at his *lma Mater*. Three years' study in Europe, uring which he mastered the French, Spann and German languages and literatures, ted him for the position which he asmed at 21. Choosing literature as a rofession as early and as definitely as did owell, Longfellow was later in finding mself. His studies and travels had led m to revere the great writers of the past id of foreign lands — especially of Gerany, on which the shadows of Goethe and hiller still lay. In comparison with these distrusted his own powers. So, until was more than 30, he mainly wrote ose of a poetic, mystic character, that owed the German inspiration. This, owever, established his reputation as a holar, and won his appointment to the chair of *belles lettres* at Harvard. In 1836, after another year abroad and the death of his young wife, he went to Cambridge. He secured a room in Craigie House which he afterwards bought, and this continued to be his home for 46 years. There he wrote *Hyperion*, which closed the first period of his literary life. This was in 1839. He had looked into the mind of Jean Paul Richter, when he wrote it, but although it was received with enthusiasm, he now took for his motto: "Look into thine own heart and write." Within a year he published a little volume of poems entitled *Voices of the Night*, which contained *The Psalm of Life*. Dumb, moral, prosaic New England, that cared more for virtue than for verse, had found a voice at last; one that was simple and musical and true, but that had an unknown charm and matchless art. The *Ballads* which followed contained *The Wreck of the Hesperus* and *The Village Blacksmith*.

At the very height of his popularity Longfellow wrote his *Poems on Slavery*. The subject was bitterly discussed at the time, and the poet suffered by ranging himself on the side of the abolitionists. His muse was temporarily obscured. In 1842 he married again, bought Craigie House and became the center of a charming, cultivated circle in Cambridge. Here he shone at his best in his rare social gifts. In 1847 he published *Evangeline*, and rewon more than his old popularity at home, and became famous abroad for this "tenderest idyll" in the English language, as it was called by a critic. With *The Building of The Ship*, published when the Union had begun to be threatened, he appealed to patriotism in a noble way that endeared him to the people. Before the Civil War broke out he had published *The Golden Legend*, *Hiawatha* and *The Courtship of Miles Standish*. *Hiawatha* was widely discussed and attacked, both as a poem and as to its faithfulness to Indian legends. Its meter, new to English verse, was taken from *The Kalevala* the epic of Finland and of a primitive people, which made it seem so genuine an expression of the red man. It proved the poet's wonderful versatility. He was yet to draw inspiration from the Old World in *Tales of a Wayside Inn*. Really at home in Europe, familiar with modern languages, foreign manners, customs and literatures, he enlarged the field of our vision, stimulated historic imagination and quickened our sympathies. Foreign travel had not then become easy or common, and the tide of immigration had not yet set in strongly; so we had no sense of fellowship with the people of Europe and little feeling of our own historic past in lands beyond the seas. Longfellow supplied that lack, and widened and enriched the intellectual horizon of his time.

spent his whole fortune in clothing his men. Congress in 1790 voted him $2,400 yearly and a township of land near Utica, N. Y., where he died on Nov. 28, 1794. See *Life* by Kapp.

Steu'benville, O., a city, county-seat of Jefferson County, is on the Ohio, 68 miles below Pittsburgh, by rail 43 miles from Pittsburgh. It is in a rich farming-country, with large coal-mines and natural gas, and has a large trade. It stands high on the right bank of the river, is well laid-out, and has foundries, machine-shops, rolling-mills, tin and paper mills, blast-furnaces, boiler-works and factories of nails, glass, pottery and white lead. The city is built on the site of Fort Steuben, which was erected in 1787 and named after Baron Steuben. The permanent settlement was made in 1797. It is served by three railroads and three interurban lines. Population 35,000.

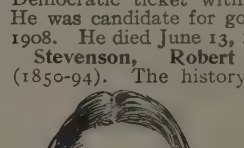
Ste'vens, Alfred, an English sculptor, was born at Blandford, Dorset, England, in 1818. His great work, which ranks him among the great sculptors of England, is the monument of Wellington for St. Paul's Cathedral, London, one of the finest pieces of modeling in England in the 19th century. It was begun in 1856, but was left unfinished at his death on May 1, 1875. In 1892 it was moved from the side chapel, where it had been almost hidden, to the place for which it was originally intended. See *Alfred Stevens* by Stannus.

Stevens Point, Wis., a town, county-seat of Portage County, is on Wisconsin River, 161 miles northwest of Milwaukee. It has a lumber-trade and a number of lumber-mills, besides furniture-factories, foundries, machine-shops, railroad-shops and flour-mills. It has public and parochial schools, a high-school, a commercial school and public library. One of the normal schools of Wisconsin is here. Pop. 14,000.

Stevens, Thaddeus, American statesman, Republican and antislavery man, was born at Peacham, Vt., April 4, 1792, and died at Washington, D. C., Aug. 11, 1868. After graduating in 1814 at Dartmouth College, he studied law and practiced at Gettysburg, Pa., and was subsequently drawn into politics, serving for a time in the state legislature in the Whig interest and becoming an active advocate of the public-school system. In the Whig interest he later served several terms in Congress, and meanwhile removed to Lancaster, Pa., where he rose to a prominent position at the bar. In Congress, in 1850, he opposed the Clay compromise measures, including the fugitive-slave law. In 1858 he was returned to Congress as a Republican, and became one of the ablest leaders of that party, manifesting great powers as an orator. He was a pronounced advocate of emancipation and the enfranchisement of the negro; was bitterly hostile to the seceding states; and stringent in his proceedings against them. He lived to take an active part in the unsuccessful impeachment of President Johnson and to see the readmission into the Union of the first group of reconstructed states. Though skeptical in his religious opinions, he was reverent in his attitude to Christianity — the devout faith of his mother. Part of his estate he bequeathed to an orphan-asylum at Lancaster, Pa., to be open both to white and colored children.

Ste'venson, Adlai E., was born in Christian County, Ky., Oct. 23, 1835. After graduating at Central College, he studied law and was admitted to the bar in 1858. He began the practice of law in Metamora, Ill., and remained there for ten years. He then removed to Bloomington, and was elected Congressman for that district in 1874 and 1878. He was appointed first assistant postmaster-general in 1885 by President Cleveland, and in 1892 was elected vice-president of the United States on the Democratic ticket with Grover Cleveland. He was candidate for governor of Illinois in 1908. He died June 13, 1914.

Stevenson, Robert Louis Balfour (1850-94). The history of English literature records no braver story than the life and work of this blithe story-teller, tender poet and charming essayist. Born in Edinburgh, Scotland, November 13, 1850, he spent much of his childhood in bed, with but the frailest hold on life. He died at the early age of 44. With a period of 20 years while waging a long fight with death, he produced an enormous quantity of work of enduring quality. Constant pain and over-powering weakness he did not permit to affect a cheerful spirit, nor to quench the flame of joy that burns in every line he wrote. In the autobiographical poems entitled *A Child's Garden of Verse* Stevenson shows how, shut-away from ordinary childish pleasures, he created a wonder-world of romance out of the simplest things. His bed was "the *pleasant* land of counterpane," not a weariness. Always happy, he was a source of happiness, if of anxiety, to his father and mother, to good Aunt Balfour and to his Scotch nurse who never had the heart to be cross with the "wee, winsome laddie."



ROBERT STEVENSON

When he grew older, he was able to take the course in Edinburgh University and to study engineering and law, but no regular study was possible in childhood. So he lived

The Poetry of Art

Myth Allegory Legend

© Horace K. Turner Co. *Boston Museum*

Automedon, with Horses of Achilles, by A. G. Regnault (French b. 1843)

Aurora, by Guido Reni (Italian b. 1575) Palazzo Rospigliosi, Rome

Love Grown Cold, by Jean Aubert (French b. 1824)

A Reading from Homer, by Alma-Tadema (English b. 1836) ©H. K. Turner Co.

SIR GALAHAD—*George F. Watts*

His strength was as the strength of ten,
Because his heart was pure.

e, so that one cannot predict what a
lling will produce. See PLANT-BREEDING
PROPAGATION. See Thomas: *The Ameri-*
Fruit Culturist and Goff: *Principles of*
nt Culture.

rail or **Graal, The Holy,** the subject
omance in the middle ages. It is the
e given to the cup used by Christ in
Last Supper, in which, according to
lition, he changed the wine into his
d. This cup, kept by Joseph of Ari-
hea, was used to receive the blood
ch flowed from the wounded side of
st as he hung on the cross. This ac-
nt is found in the gospel of Nicodemus,
ch is not accepted as one of the books
he New Testament. Traces of the tra-
n are found in the struggles between
rs and Christians in Spain and in the
ding of the order of Templars in Pal-
e. It is best known as one of the
nds that cluster around the story of
g Arthur and his knights. As the story
es, Joseph of Arimathea had been kept
rison by the Jews for fifty years after
death of Christ, but had been miracu-
ly preserved from old age and death
the possession of the Holy Grail. He
released by Christ, who, teaching him
words used in the ceremony of the
s, commanded him to observe daily the
ament of the Last Supper. Joseph
e to Britain, and his son became the
bishop of the island. The last pos-
r of the Holy Grail sinned and the
was lost. The Quest of the Holy Grail
the search for this lost treasure under-
n by Arthur and the Knights of the
nd Table. As it had been lost through
impurity of its possessor, so it could
ound only by one who was perfectly
. Launcelot, who had reached the
n where it was kept, was warned to
art, but, disobediently looking in, was
wn to the ground by a blast of fire,
re he lay "twenty-four days and as
y nights as a dead man" Sir Galahad
ording to some Sir Perceval) alone of
knights was pure enough to see the
y Grail, which was soon after taken up
eaven. Several churches in France and
y claimed the possession of this cup,
the Crusaders found one which was
ght for a time to be the true Holy
l and is still kept in the Cathedral of
pa. In literature the story has had a
minent part, and is the subject of one
ennyson's beautiful *Idylls of the King*
of Wagner's opera of *Parseval.* See
ls of the King by Tennyson; *Morte d'*
ur by Malory; and *History of the Holy*
l by Furnival.

rain-Eleva'tor, a building erected pri-
ily for the purpose of storing grain,
paratory to its shipment in large quan-
s. A grain elevator is often situated
ome port. It usually consists of large bins in which grain may be held, and a structure at the top called a cupola containing machinery for loading and unloading the grain. Machinery for cleaning the grain often occupies the lowest of three stories.

The unloading is commonly done by means of large shovels operated by machinery connecting with some sort of carrier to hoist the grain to a huge hopper high up in the building, whence it can be emptied by means of spouts into any desired place below, such as storage bin, weighing hopper, cleaning hopper or exit spout for reloading.

Throughout some parts of the country, as for instance in the wheat-growing district of the northwest, there are quite large elevators erected at railway stations for the purpose of providing farmers with good facilities for shipping their grain. In older and more thickly settled agricultural communities, with better railway facilities, smaller elevators usually suffice.

Grain elevators used to be constructed largely of wood, but the great loss resulting from the destruction by fire of elevators filled with grain has led to the practice of putting up fireproof structures wherever practicable. The most modern elevators usually have steel bins or concrete ones with steel framework, outside walls of brick or stone and a cupola of steel framing covered with iron.

Some of the largest grain elevators in America are at Chicago and at different ports on Lake Superior and others of the Great Lakes.

Gram'mar. Grammar, or the science of language, has always had an important place in the schools. Three hundred years ago and for a long time after, grammar, especially Latin grammar, held the first place in the schools. But with the growth of the common-school system grammar dropped into the background. Even in the grades of the common-school grammar holds a less important place than formerly. More thoughtful teachers omit grammar almost entirely in the first six grades, leaving it to the last year or two of the grammar-school.

The chief reasons why the study of English grammar has lost its former importance may be stated as follows: 1. English grammar is admittedly unsystematic and irregular, with few inflections and an abundance of peculiar idioms and exceptions to rules. It does not serve, therefore, the supposed purpose of discipline, such as was formerly believed to be the special merit of Latin and Greek grammar. 2. It has been discovered that the study of grammar does not produce such important effects in leading to correct usage in common speech as was formerly supposed. It has been observed that children go on

barous and semibarbarous races, art in all its stages of development.

ORIENTAL ART.

Japanese Pottery. Probably there is no other place in the world where art is so much lived and lived with as in Japan. Every article of religious, military, domestic or personal use is produced with a special view to its being beautiful, not only in workmanship, but in its design and its adaptability to its use, by a class of artisans whose craft has descended through many generations. and thus represents an accumulated skill that is quite impossible under the factory-conditions which force each workman to execute only a part of the product. Things do not go out of style in Japan. The few things that are necessary are chosen with the utmost care, and, being hand-made and well-made, last a long time. The Japanese excel as metal-workers, enamelers, lacquerers, wood-workers, textile-makers, printers and potters. As space is so limited, the last named craft is the only one which will be treated here.

Japanese pottery is distinguished for refinement of form, varied and wonderfully executed design and unparalleled range of color. The most famous potteries are those of Arita, Kyoto, Kaga, Satsuma and Awari. Satsuma and Arita have produced both pottery and stoneware that compare favorably with anything of the kind that has been made anywhere in the world. The rudiments of this art as of many others were learned in China, and the Chinese influence is frequently traceable in the design. Japan is richly endowed by nature with all the materials in the form of clays and minerals that are used in the making of pottery and its colors, both of which they have used in bewildering variety.

In the 13th and 14th centuries there was a preference for the iridescent black, red, brown and dark-green of the Raku ware, but late in the 16th century, when the tea-ceremony became popular, taste in the matter of pottery underwent a marked change. Ninsei founded the kilns that produced the Awata, Kiomidzu and Omura wares. Ninsei was very skilled in the use of the brush, and decorated his wares with birds, flowers and human figures in creamy blue, light green and coral glazes. Kenzan and Yeiraku were famous potters who worked during the latter part of the 17th and the early part of the 18th century. Both were great colorists, but somewhat neglected form.

Japanese pottery can best be identified by its color. A soft gray-green is characteristic of the kilns of Sanda Seiji; grays and salmon of Haji; yellow-brown of Oki; and drip-glazes of Oriba. Satsuma is the most popular of all It is famous for its soft, creamy-white backgrounds that like old ivory and for its soft colors gold. The 19th century produced Bizen ware that is remarkable for its w derful metallic brown and blue glazes. the present time the development of p tery is at a standstill, and many of kilns are producing inferior articles for foreign market. See Bower: *Japa Pottery* and Hartmann: *Japanese Art.*

Japanese Painting and Sculpture. Sc ture and painting may be said to have their beginning in Japan between seventh and ninth centuries A. D. T were derived from China, as were initial movements of all Japanese cult The earlier phases both of painting sculpture show, very distinctly, an In influence, and this is explained by the that Japanese art had its inspiration in introduction of Buddhism that came Japan from India through China and Ko The native religion was Shintoism whic little more than a system of ances worship. Its sacred colors were red white, and its temples were extremely sir in construction, with no decoration wo the name, and contained little else the sacred mirror. Hence this form worship offered few inducements for development either of an architectur design. Buddhism, on the other hand, a well-developed ritual and an organ priesthood, and was rich in its syste symbolism of form and color.

We find that sculpture, except as used in decorative wood-carving, was a natural means of expression, and it soon abandoned in favor of a form of that could be expressed with the wri brush. Sculpture, therefore, must be pl early in the history of this art. It i stricted, almost entirely, to huge br statues of Buddha, prominent an which are the Buddhas of Nara and K kura, the latter of which is a seated fi nearly fifty feet high. It was complete 1252, while the former was finished in Besides these and other colossal bro there are many gigantic wooden te statues of Buddha and other gods goddesses. This sculpture is frequ very vigorous in treatment, and empha spirit rather than form. The sculpt decoration of the temples and te furnishings is lavish in its design as as in its use of symbols and color.

The painting of Japan may be clas into seven distinct movements, namely Buddhistic from the ninth to the tw centuries; the Yamato-Tosa from the to the fourteenth century; the Se from 1421 to 1507; the Kano from 14 1750; the Okio or Shijo from about to the present period; and the Ukioye about 1640 to the present time. The named school, which produced the

n Assyria and Persia are found the ruins great palaces; among the oldest is the thwest palace of Nimrod, built about B. C. A palace at Susa, Persia, was

ROMANESQUE—CATHEDRAL OF WORMS

dently built of brick and faced with ors in enamel. The Greeks are thought have taken some of their ideas in build- from Assyria and Persia. But it is in ece that we find the greatest number l most perfect specimens of ancient hitecture. The temples and theaters of a Minor and Greece were of great mag- cence and wonderful for their grace and icacy of outline. (See ATHENS.)

There are three styles of Grecian archi- ture, called the Doric, the Ionic and the rinthian, the most important difference ng in the head or capital, as it is called, the pillar. The most flourishing period Greek architecture was from 650 to B. C.

The Romans borrowed mainly from the eeks, but used their architecture not only

GRECIAN DORIC—TEMPLE OF JUPITER AT OLYMPIA

on temples and theaters, but on many ner kinds of buildings, such as baths, dges, aqueducts, triumphal arches and private houses. They borrowed the round arch from the Etruscans, and soon made use of its principle to construct immense circular domes or vaults. Many great Roman buildings still remain. When Byzantium became the capital of the Roman empire, Roman architecture was in use there. The dome was specially affected by the Byzantines. In the reign of Constantine the Christians were allowed to build churches, and the term Byzantine designates the architecture of the Christian churches of eastern Europe and Asia Minor of that period. One of the finest of these churches is that of St. Sophia at Constantinople.

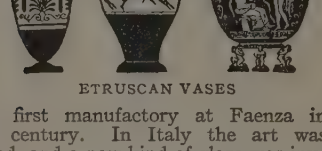
Romanesque is the name given to the various round-arched styles which arose in Europe after the inroads of the northern barbarians. The Saxon style of building was rude and simple. It was followed in England by the Norman, which is distinguished by the rich and odd carving on the doorways and arches. Most of the best-known buildings in England and Scotland belong to this style. The Gothic or pointed style followed, with its three periods. In the first we find the narrow, pointed windows and high gables and roofs. A part of Westminster Abbey is built in this style. In the second period, the windows are divided into small panes, the upper part filled with beautiful tracery in waving lines. The third period is called the perpendicular period. The tracery is no longer in wavy, but in straight, lines. The doorways have square tops over pointed arches. Westminster Hall in London is a good example of this style, which lasted from the end of the 14th to the middle of the 16th century. At the time of the great revival of learning in Italy, in the 15th century, the old Roman style of architecture, in a slightly altered form, was revived. This style is called the Italian Renaissance. St. Peter's at Rome and the Louvre and the Tuileries at Paris are good examples of it.

Another style of building is the Moorish or Saracenic, which dates back to the 9th century. It is noted for its graceful towers, beautiful domes, the slender pillars which support the walls and for the frequent use of the arch. The Moorish palace of the Alhambra well illustrates this style.

Modern architecture is the name employed for all varieties of building in use since the Renaissance. In the 18th century Greek forms were copied, and in the 19th century the Gothic form was popular. All modern architecture is in imitation of the older forms. Churches are largely imitations of the Gothic, while private buildings are of the Renaissance type.

Arcot (*är-kŏt'*), a city of Hindustan, once the capital of the Carnatic, is situated on the Palar, about 70 miles southwest of Madras. In it are many ruins, among them the palace of its princes, who were called

king of Rome, is said to have instructed the Etruscans and Romans in this art. The Arabs seem to be entitled to the credit of having introduced the manufacture of glazed ware into modern Europe. The Italians are said first to have become acquainted with this kind of ware as it was manufactured in the Island of Majorca, and hence they gave it the name of *majolica*. They set up



ETRUSCAN VASES

their first manufactory at Faenza in the 15th century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. (See ROBBIA.) The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faience*. About the middle of the 16th century the manufactory of Bernard Palissy (*q. v.*) at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished. A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name. The principal improver of the potter's art in Britain was Josiah Wedgwood (*q. v.*) in the 19th century. Porcelain or chinaware first became known in Europe about the end of the 16th century through the Dutch, who brought it from the East. In the United States the manufacture of pottery and porcelain is of recent development but has already attained considerable dimensions, the leading establishments being located at Trenton, N. J., and at Cincinnati, Akron and East Liverpool, O.

There are general principles and processes common to all kinds of pottery and porcelain. The first operations are connected with the preparation of the potter's paste, which consists of two different ingredients: an earthy substance, which is the clay proper and a siliceous substance, which is necessary to increase the firmness of the ware and render it less liable to shrink and crack on exposure to heat. The clay is first finely pulverized and reduced to the consistency of cream, when it is run off through a set of wire gauze or silk sieves into cisterns, where it is diluted with water to a standard density. The other ingredient of the potter's material is usually ground flints or flint-powder, as it is called, which, treated in much the same way as the clay, is finally passed as a creamy liquor into a separate cistern. These liquors are now mixed in such measure that the dry flint-powder bea to the clay the proportion of one sixth, o fifth or even more. The mixture is th forced into presses, lined with cloth, means of a force-pump, the cloth retaini the clay and allowing the water to esca The clay now forms a uniform inelastic ma which is cut into cubical lumps and tra ferred to a damp cellar, where it rema until a process of fermentation or disin gration renders it finer in grain and not apt to crack in the baking. It is then su ject to another operation, called *slapping wedging*, which consists in repeatedly brea ing the lumps across and striking th together again in another direction, dashi them on a board etc. This final process incorporation is now most frequently p formed by machinery.

In making earthenware vessels, if they of a circular form, the first operation af the paste has been made is turning, te nically called *throwing* them on the wh

Successive Stages of Earthenware Vessel on Potter's Wheel.

This is an apparatus resembling an ordi turning-lathe, except that the surface of *chuck* or support for the clay is horizo instead of vertical. The chuck in fact revolving, circular table, in the cente which a piece of clay is placed, which potter begins to shape with his hands. rotary motion of the table gives the c cylindrical form in the hands of the po who gradually works it up to the inte shape. It is then detached from the re ing table and dried, after which, if inte for finely-finished ware, it is taken to a and polished. It is at this stage tha handles and other prominent parts are f on, which is done by means of a thin of clay called *slip*. The articles are removed to a room in which they are more thoroughly at a high tempera When they have reached what is calle *green* state, they are again taken to a and more truly shaped as well as smoo and burnished. When the articles ar of a circular form and, accordingly, ca

THE FIGHTING TEMERAIRE—*Turner*

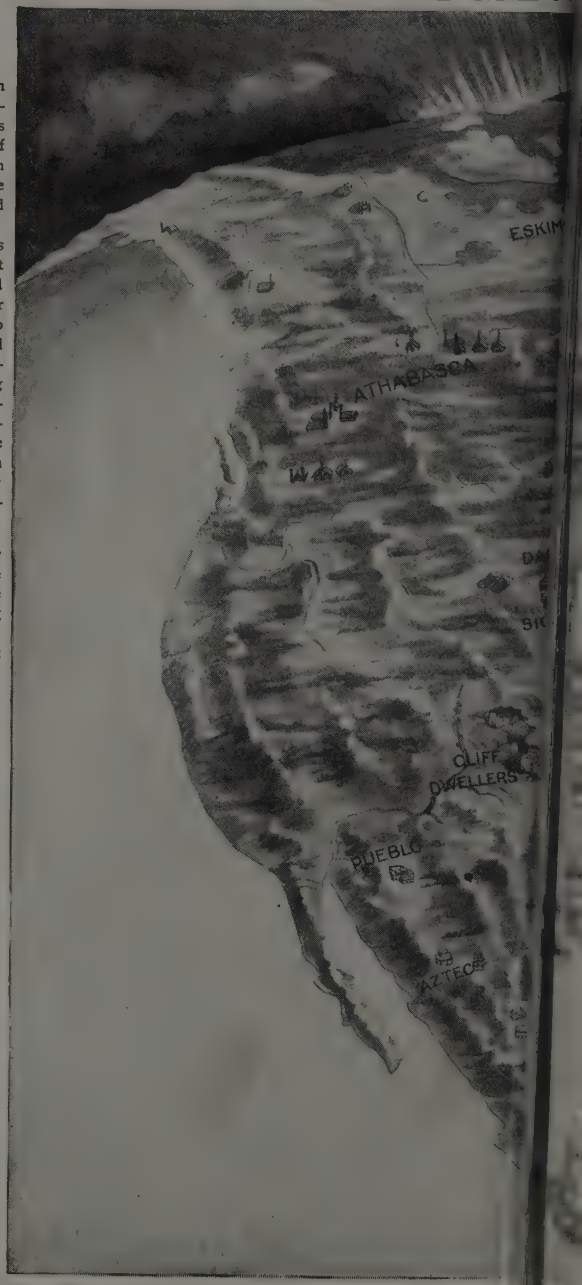
CHIEF YELLOW BOY GIVING THE PEACE SIGN
Note that he has dropped his cartridge belt and war bonnet at his feet.

THE HOMES OF THE REDMEN

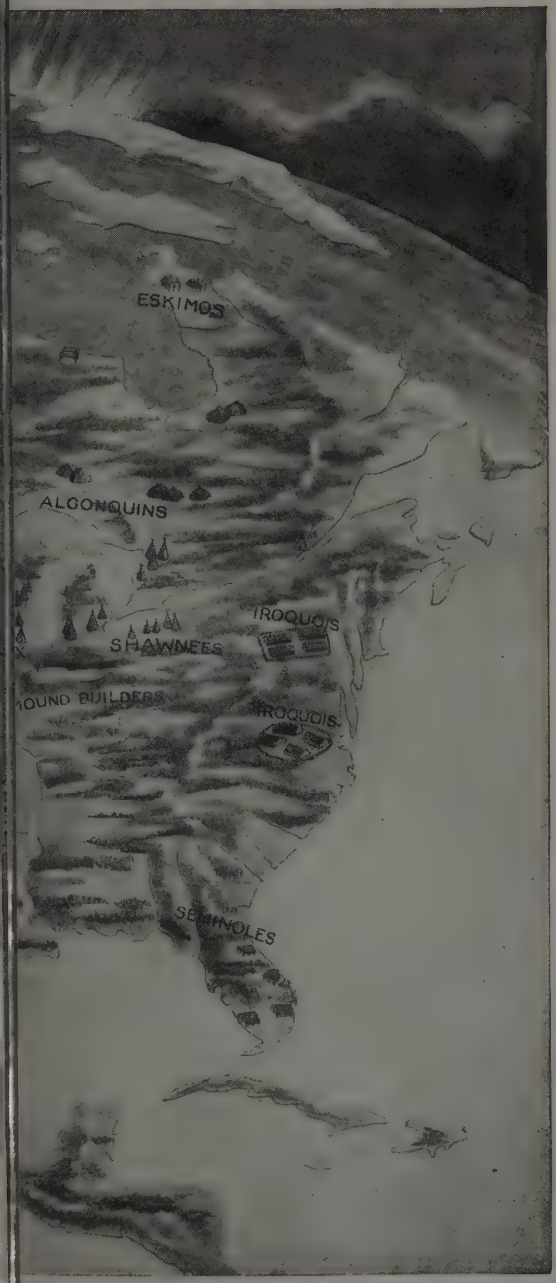
You are looking down on the scattered world of Indians as it existed in this big wild North America of ours before the white man came. On the extreme north are the Eskimos and on the south the Aztecs. The different nations, as you can see, had different styles of architecture and built according to their needs. The Indians who lived in the Arctic and Temperate regions had comparatively simple dwelling places and erected no temples to the gods they believed in because they were obliged to be constantly on the move to secure their food, which consisted largely of game.

The Eskimos built snow houses in the winter time and lived in dug-outs in the summer months. During the fishing season they lived in box-like houses built upon stilts. Indians in Alaska and Canada built quite substantial houses of planks.

The Aztecs and the Mayas who lived in the warm climate of Mexico and Central America, on the other hand, were not obliged to keep moving all the time, and so not only developed an architecture much more elaborate than those of other Indians, but an architecture that ranks among the most interesting in history. The cliff dwellers also had a more highly developed architecture than other Indians because for protection against their enemies they remained in one place—the region of the cliffs, and so they also had time and opportunity to develop their style of building.



MERICA WAS A WILDERNESS



The Algonquins lived in round houses furnishing shelter for as many families as the log houses of the Iroquois. Indians throughout Kansas and wherever the long grass was abundant, built houses of woven grass supported by a frame work of saplings.

The Iroquois, you see, built log houses and enclosed their villages inside of a stockade. As you would suppose, from a look at these houses, the Iroquois were considerably more advanced than Indians like the Pawnees, Shawnees and Foxes, who lived in wigwams.

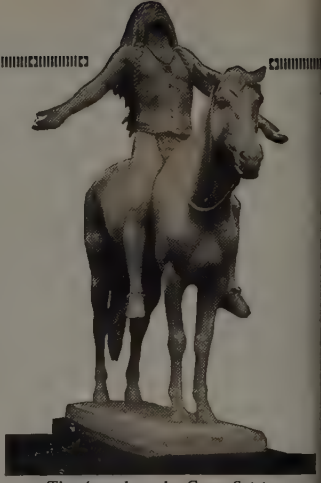
The Prairie tribes, as a rule, built their cone-shaped wigwams with saplings fastened together at the top and covered with buffalo hides. The Dakota Indians, however, although a prairie tribe, had more substantial dwellings in their permanent villages, in addition to the wigwams used in the hunting season.

The mound builders had their homes in the Mississippi Valley and in other parts of North America, but these mounds were found most extensively in Ohio, Indiana, Illinois and Missouri. Little is known of them except what the contents of the mounds reveal. One theory is that they are the ancestors of more civilized Indians found in the southern states or of the Aztecs in Mexico.

The Seminoles lived in the swampy lands of Florida and built their houses upon stilts, raising the floors several feet above the ground.

The American Indian in Art

"THE Appeal to the Great Spirit" is one of a series of four works of sculpture dealing with the history of the Indian in his contact with the white men. The Indian is here protesting his wrongs and appealing to the Great Spirit for help. In "The Coming of the White Man," notice that the Indians, astonished and frightened at the great, white-winged "water bird," have run away from their wigwam home on the beach and are cautiously watching it. The story of the march of Miles Standish, led by "Hobomok, friend of the white man, through forest and swamp, and along the trend of the seashore," you will, of course, read in Longfellow's majestic verse in connection with your reading of the picture.



The Appeal to the Great Spirit
by C. E. Dallin (American b. 1861)

© *A. W. Elson & Co., Boston*

The Coming of the White Man, by Robert Reid (American b. 1862)

The Taos Indian belongs to the semi-civilized Indians, such as those of New Mexico. They

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Taos Indian Roasting Corn

not only made baskets and pottery, as shown in the picture, but built towns and temples.

The March of Miles Standish, by G. H. Boughton (American b. 1834)

t fall merely anywhere, but only in such
ys that tone and tone and interest and
erest shall be fairly held at pleasing
ervals. Consistency of character, which
s been called harmony, consistency of
ractions, which has been called balance,
l consistency of movement, which has
n called rhythm shall keep all elements
the work together in an integral whole.
re again the artist in forming his work
st exercise his æsthetic judgment, vary-
from nature's appearances, if need be,
bring finer proportion into his work,
give it more perfect unity.
The beauty of a picture or a piece of music
es not lie in a pleasing of the sense alone.
haps it is impossible for the sense to
engaged at all without the mind re-
ving some deeper message through it.
is this fact which causes us to observe
another place that art is a sort of lan-
ge. But the message which that lan-
ge has to deliver is not an intellectual
. It is not primarily for the rehearsing
facts that art exists. The message
ich a picture has to give, like the message
ich music has to give, comes to us in
form of an experience, a mood which
work awakens within us—not a story
ich the thing can tell us. A Bokhara
may be of "sleepy coloring" and give
the repose of twilight as we contemplate
a clear melody may give us the same
lings as a view from a mountain-top; a
h of thrilling color may be to us like a
tle-hymn. Such are the messages we
y receive from pictures and music if
but will, instead of the story that "here
man and he is doing so and so." These
the feelings which come to us straight
m the heart of the artist himself, even
ugh he be centuries in his grave; the
e, the figure and the incident which the
k involves are merely the words by which
message is conveyed.
For some reason music in a minor key
apt to make us sigh. For some like
son certain kinds of lines or movements
a picture give us certain emotions.
haps it is because these lines or move-
nts recall associations which stamped
mselves upon the impressionable child-
d of the race. The ridges of the sea
ich we call waves and the grander ridges
the continents which we call mountains
e had their common origin in the war
play of the elements—in activity rather
n in quiet. The risings and fallings of
waves and the mountain-ranges, the
h, straight stems of those still forests
id which generations of our primitive
estors spent the long days and the
sterious nights, the long flat reaches
the sea when it is calm and of the desert
l of the clouds in a quiet sky—all these
ngs have been seen and watched for
s; nor is it to be wondered that the lines which we see in them, the movements which we feel in them, have come to call up the same feelings which these things themselves called up.

Let us look at Corot's landscape *Morning*. It has come to be called *The Dance of the Nymphs*. Is this because there is a group of tiny figures at the bottom—who in truth are scarcely dancing and who may hardly be called nymphs? Or is it because of the witchery of that great movement which takes us from the bottom up into the picture, across the top and down the other side, lastly circling round and round the bit of sky in the center, leading us, before we know it, in an airy dance through the tree-tops? The little figures give the key-note—they form a statement of the theme, Morning, Happiness, Dancing, but even if they were suddenly to whisk themselves out and disappear on the other side of the tangled shrubbery, the movement of the picture would still go on, and it would still be a dance of the nymphs.

For a contrasting mood see Turner's great picture, *The Fighting Temeraire*. What is there about this picture to show us that this ship is the old hero of England's battles that she is,—or to tell us that she is being towed away for breaking up? And yet Ruskin says that, of all pictures not visibly involving human pain, this is the saddest. What has the artist done to make us feel the solemnity of this occasion? We see a sheet of still water under a great, bending, sunset sky. On the other side a tall ship is coming up, towed by a black tugboat. Long ripples are thrown to left and right, and thin smoke pours back from the funnel of the tug. Shadows are gathering from all sides, and there are the buildings of a great city beyond in the gloom. Study the use of lines. Are they like those merry ones that circle round the canvas of Corot's *Morning*? Or are they the lines which we see in the solemn groves of pine or cypress, in the desert and in the great cathedrals? Are they not like figures in a funeral march? Has the artist accepted nature only as he found her?

We have shown the three principal considerations which compel an artist always to turn away more or less from the copying of nature. Of all these, doubtless the last one which we have touched is the deepest, the one determining the trend of the whole work,—the consideration of *expression*. Intimately related to that one is the second—the consideration of *absolute beauty*; and the third is that one which deals with the *translation of the three-dimensional aspect of nature into the two-dimensional limits of a picture*. We have spoken of the lines and colors and objects of nature as the artist's alphabet and vocabulary. Were he to devote his time merely to copying the things which nature sets before him, he

Hargreaves (*här'grāvz*), **James, the inventor** of the spinning-jenny, was an uneducated weaver and carpenter of Standhill in Lancashire, England, where he was born in 1745. It is said that he was led to the invention from seeing a spinning-wheel, which one of his children had upset, continue to revolve horizontally while the spindle worked vertically. So strong was the prejudice of the weavers against the introduction of his machine, that they broke into his house and destroyed it. He removed to Nottingham in 1767, where he erected a spinning-mill. Three years later he took out a patent for his invention, but, as it was proved that he had sold several machines before the patent was obtained, it was for that reason declared void. Hargreaves died on April 22, 1778. See *Lancashire Worthies* by Francis Espinasse and *Lives of Eminent Mechanics* by Henry Howe.

Har'lan, John Marshall, was born in Boyle County, Ky., June 1, 1833. He was a colonel in the Union army in 1861, and in 1863 he was made attorney-general of Kentucky, and became one of the associate justices of the United States supreme court in 1877. In 1893 he was one of the American arbitrators on the Bering Sea tribunal which met at Paris. Died Oct. 14, 1911.

Har'land, Marion. See TERHUNE, MARY VIRGINIA.

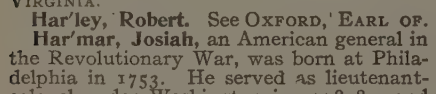
Har'ley, Robert. See OXFORD, EARL OF.

Har'mar, Josiah, an American general in the Revolutionary War, was born at Philadelphia in 1753. He served as lieutenant-colonel under Washington in 1778–80, and with General Greene in the south in 1781–82. He was selected to carry to France the ratification of the treaty with England, which ended the Revolutionary War, and became general-in-chief of the army in 1789. Fort Harmar, at the mouth of Muskingum River on the Ohio, was named after him. He died at Philadelphia, Aug. 20, 1813.

Har'mony, from the Greek word *harmonia*, meaning "a concord of sounds, music, or a system of music" (which itself is probably derived from an ancient root-word meaning to fit or join), is one of the three essentials elements of music, without which music never has existed and never can exist.

If the following succession of sounds, called tones,

EXAMPLE 1



be thought, sung or played, it will be felt to be as meaningless, as incoherent, musically, as the following succession of sounds, called syllables,

EXAMPLE 2

Eightnez zar nebkud you ha

is incoherent and meaningless as languag That is, the succession of tones in Exampl 1 does not express music, although the is rhythmic coherence; nor does the su cession of syllables in Example 2 expre language.

In the following succession of syllab sounds

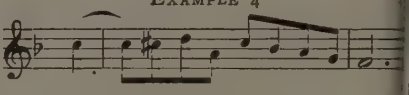
EXAMPLE 3

Nebuchadnezzar ate hay

coherency, unity and meaning — therefo language — appear, although we have p cisely the same sounds as in Example The difference is solely in the relation the sounds in respect to their order a groupings.

Similarly the following succession tones, all of which are to be found Example 1,

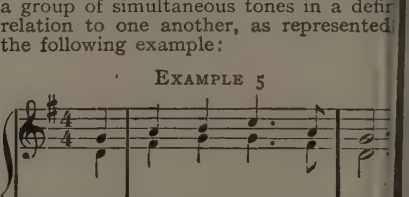
EXAMPLE 4



expresses coherency, unity and music, cause a feeling of tonal relationship is i mediately recognized. There is a vital d tinction to be made, however, between t syllabic and tonal relations. In the for they are largely if not purely arbitrary lations in respect to order and group established by usage; in the tonal succ sion, on the contrary, the relationship not arbitrary, but immanent in every herent grouping of tones, whether c ceived of successively or simultaneously

Further observation of melody rev the fact that each melodic incident sugge a group of simultaneous tones in a defi relation to one another, as represented the following example:

EXAMPLE 5



That is, the first, third and sixth tone the melody suggest the group *g, b, d;* second and fifth tones, *d, f, a* (the line a letter stands for a sharp); and the fo tone, *c, e, g.* Here again we see that lation, that is, harmony, is the basi the unity of these groups of simultan tones. Such groups of simultaneous t expressing definite relationships are ca in general, *chords.*

CIVIL GOVERNMENT

VERNMENT

Definition: Old classification, Monarchy, Aristocracy and Democracy.

Modern and more valuable classification.

Difference between presidential systems, as that of United States, and parliamentary systems, as that of England.

State government in the United States; county government; township government; city government; school districts, 787.

VERNMENT OF UNITED STATES

The nation a federal republic, powers defined by the national constitution.

Each state a representative republic, without sovereigaty and without any relation to any foreign power.

Federal government administered by the executive, legislative and judicial departments, 1973, 1974.

Executive power and duties vested in the president and administered through departments of state, treasury, war, navy, postoffice, interior, justice, agriculture, and commerce and labor. Organization and scope of these departments, 1984, 1985.

Legislative authority, vested in Congress, consisting of senate and house of representatives. Members of each house and how chosen, 1974, 442, 443.

Powers and duties of each house, course of legislation, 442.

Judicial authority, vested in Federal courts, 1974, 466, 468. (See Courts of Justice.)

State Governments: Representative republics without sovereignty and without any relation to any foreign power. Powers are those not delegated to Federal government and are derived from citizens of state. States determine suffrage and control elections, criminal and civil law, property and civil relations, source of revenue, local government, 1974.

Municipal Government: Scope and limitations in different states.

Two kinds, department government and government by commission. Details of system and methods as illustrated in charter of New York City, 1278.

National Municipal League, measures advocated; initiative and referendum, 1279.

Municipal government in foreign cities, 1279.

URTS OF JUSTICE

Primitive forms; function of courts, to punish (criminal cases), to arbitrate (civil cases); courts now subordinate to system of law and precedents. Roman courts established distinction between law and equity. Trial by jury, 466.

English system of courts; inferior courts and their functions; supreme court, Chancery, Kings Bench, probate and admiralty divisions; courts of appeal, 467.

HOW A BILL BECOMES A LAW

By placing the Bill in a basket for that purpose, a member introduces it into the House of Representatives. It is given a number such as H.B. 729. After the first reading the Bill is sent to the proper Committee.

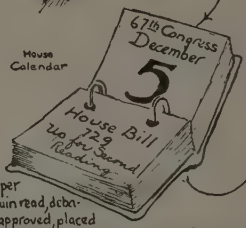
After considering the Bill, the Committee either "pigeonholes" it, or reports it back to the House, recommending that it be

1. Passed
2. Rejected
3. Amended

It is then placed on the House Calendar for action.

NOTE—
The House Committees number about forty-eight, the chief being

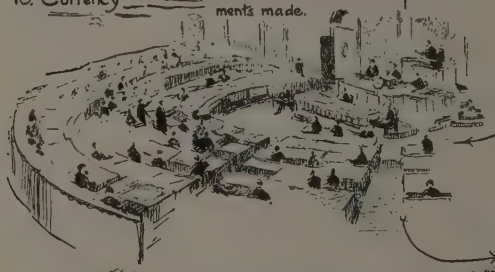
1. Ways and Means
2. Appropriations
3. Judiciary
4. Foreign Relations
5. Military Affairs
6. Naval Affairs
7. Commerce
8. Rivers and Harbors
9. Rules
10. Currency



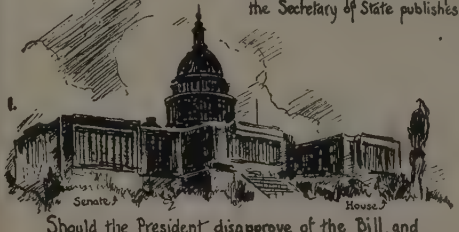
If passed by the House, the Bill is sent to the Senate. Bills originating in the Senate are introduced by a Senate member. The Bill then goes through much the same procedure as in the House.

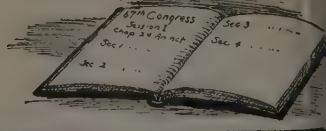
1. First Reading.
2. Proper Committee
   a Finance
   b Commerce
   c Appropriations
   d Foreign Relations
   e Interstate Commerce
   f Military Affairs
   g Naval Affairs
   h Public Expense
   i Judiciary
   j Rules
3. Reported back with recommendations.
4. Second Reading and Debate
5. Third Reading Vote on Final Passage.

On the proper day it is again read, debated, and if approved, placed again on the Calendar. On the third reading a vote decides whether or not it shall pass with the amendments made.



When the Senate has passed the Bill it goes to the President. If he approves and signs it the Secretary of State publishes it as a Law.





Should the President disapprove of the Bill, and veto it, it can become a Law only if voted on again and given a two-thirds vote in both Houses.

Bachrach Studios

PRESIDENT HERBERT HOOVER

"The first business man in a country of the biggest business men in the world. . . . It is certain that with Hoover as President, America will never suffer cold, nor hunger, nor privation."

—Stephane Lauzanne, Editor of *Le Temps* (Paris)

THE story of the poor boy's rise to fame is well known to every American. In our country, poor boys so often become successful, and rich, and famous that we take all that for granted. Sometimes, however, the story of a poor boy's career is even yet fascinating; especially, when, in our own day, a self-made man becomes a foremost citizen of the world; is hailed as his country's first business man; and is finally honored by being made President. That has been the experience of Herbert Clark Hoover, thirty-first President, a Quaker whose life has demonstrated the Quaker virtues of industry, thrift, fair dealing, generosity, and love for his fellows.

When a child of six, Hoover was orphaned by the death of his father, Jesse Clark Hoover, a poor blacksmith of West Branch, Iowa. The mother struggled for three years to provide for Herbert and two other children; then she died. Friends sent the boy to an uncle in Oregon. The little fellow traveled part of the way with an acquaintance, and went the rest of it alone. Like early pioneers, Herbert Hoover crossed our continent and learned first-hand about America.

Having reached his uncle's home in Newberg, Herbert did chores and attended school. When the uncle removed to Salem, Herbert accompanied him. Work in the uncle's store determined the boy's future, for there he heard about life and opportunity in western mine fields. This caused him to decide upon mining as a career.

After a few years in the supply store, young Hoover went to Leland Stanford Junior University at Palo Alto, California. In 1895 he graduated, a mining engineer. He was ready to face the world. Four years of professional training, college experience as small business man and organizer of student activities — these had fitted him for a career that proved him to be one of the world's greatest business organizers and finally made him President.

After leaving college Hoover was engaged as mining engineer throughout the world. He reorganized old mines and opened new ones. He built railroads. He dealt with poor native workmen in remote corners of the globe. He bargained with great bankers and industrialists in world capitals. He learned to know men of every rank. He grew familiar with problems of labor and capital. He fitted himself to lead the world's greatest nation.

During the World War Herbert Hoover first came before the eyes of the world. He helped Americans to return home from war-torn Europe. He brought food to the starving Belgian people. As United States Food Commissioner, he made possible the feeding of our soldiers and those of our allies by teaching Americans to conserve food and to produce more of it. Even after the World War ended, Mr. Hoover spent months in eastern Europe organizing relief for the peoples there.

As Secretary of Commerce and Labor in the Cabinets of Presidents Harding and Coolidge, Mr. Hoover helped to bring American industry back to a normal condition. His success at this task, his fine understanding of America's life and needs, brought about his nomination by the Republicans and his election to the Presidency in 1928.

After his election, Mr. Hoover toured South America so that he might come to understand our neighbors there. The South American trip rounds out the world travels of the most widely traveled man who has ever been our President and the man most widely known to the world before he took that office.

(*See another account of Herbert Hoover on page 885.*)

stitution of the United States of ica. Fifty-five wearied men arose from eats in a room of Independence Hall, Philadelphia. Benjamin Franklin, aged and grey, spoke to some other members of the s they stood looking at a picture of the hind the chair in which George Washingd sat as chairman. Relieved in mind, iling at Washington and the others, he 'I had not been able to tell whether a rising or a setting sun. Now I know is the rising sun."

klin was thinking of the many disents that had arisen over the matter he body of men had met to solve—the formation of the Constitution of the United States. From May 25 until September 37, the convention had been in session. conflicts of opinion had been voiced ng the powers which should be surd by the States to the Federal Governand over the relative strength of au- which should be given each State by of its size and population. But the document had at last been signed. ner document like it had ever been in the world. It joined the States ne United States of America, and it the parent of many later constitutions were modeled on it by new republics h America and elsewhere. More than gave concrete expression and practice democratic hopes of the world which eing then expressed in France, and zed many monarchies.

he beginning, the colonies had been e and individually responsible only to Britain. A certain union of interests opposed to the colonial government of Great Britain had caused the colonies to work in y at times, but the union was purely ry, and not effective. Indeed, it was il 1781, five years after the first battles Revolutionary War had been fought, real government of any kind had been hed by the Articles of Confederation. Articles, however, had so sturdily pro- States' rights that the Federal Governound its powers so limited it could be of al service. No absolute foreign policy e put into effect, and interstate comnd relations were decided, unhappily, vidual States. In 1786 the Annapolis tion met in the hope of securing better relations, but failed in its purpose. ing must be done; something was done— r 1787 brought the adoption of the ution. The document was then given states for ratification. Delaware signed December 7, 1787. The Constitution effective following the ratification of Hampshire, June 21, 1788. Eventually States signed, Rhode Island last, on ,1790, by the close vote of 34 to 32.

The Constitution is the basic law of the United States. In general, it provides for the Legislative, Executive, and Judicial Departments, defines the powers granted to the States, the Federal Government, and to both.

The Original Seven Articles

The original Constitution contained seven articles in brief and in part as follows:

Article 1 treats of the Legislative (law-making) Department, establishing a Senate and a House of Representatives. The House of Representatives shall be composed of members chosen every second year by the people of the several States. The Representative must be at least 25 years of age, a citizen of the United States for at least 7 years, and an inhabitant of the State choosing him. The number of representatives is to be apportioned among the States according to population, but shall not exceed one in every thirty thousand; however, each State shall be entitled to at least one representative. The House is given the right to choose its Speaker, and the sole right of impeachment.

The Senate shall be composed of two Senators from each State, chosen by the Legislature thereof, for a term of six years. Regulations are provided for whereby one-third of the number of Senators should be elected every two years. The Senator must be at least 30 years of age, 9 years a citizen of the United States, and an inhabitant of the State choosing him. The Vice-President of the United States is made President of the Senate, but has no vote unless the vote of the Senate is equally divided. The Senate has the sole power to try all impeachments.

Congress is caused to assemble at least once in every year, such meeting to be on the first Monday in December unless they shall by law appoint a different day. Each House is given power to determine its rules of procedure, and expel a member by a two-thirds vote. All bills for raising revenue must originate in the House of Representatives. Other bills may originate in either House, and when passed upon by both, submitted to the President. If he signs the bill, it becomes a law. If he vetoes the bill, it shall not become a law unless favorably passed upon by both Houses by a two-thirds vote. If the President does not return the bill within ten days, Sundays excepted, the bill becomes a law.

Congress is given power to lay and collect taxes, duties, and imposts, to pay public debts, provide for the common defense, borrow money, coin money, establish uniform naturalization laws, establish post-offices, secure copy-right and patent laws, declare war, grant letters of marque and reprisal, raise and support armies, provide for a navy, provide for the calling forth of the militia, to exercise exclusive legislation over such district as may be the seat of Government, and to make all laws necessary to execute its powers.

Congress is prohibited from suspending the writ of habeas corpus except when public safety shall demand, passing an ex post facto bill, laying a duty or tax upon articles exported from any State, granting preference to ports of one State over another, grant any title of nobility.

States are prohibited from entering any treaty, alliance, or confederation; neither may they coin money, grant titles of nobility, or enter into any contract with another State.

Article 2 treats of the Executive Department. A President is vested with executive power. He is granted a term of four years, the term of the Vice-President running concurrently. Provisions are then made regarding the appointment of electors from each State who shall vote for President, the one receiving the second highest vote becoming Vice-President.

It is required that the President be a natural born citizen of the United States, a resident within the United States for 14 years, and at least 35 years of age. The President is made Commander-in-chief of the Army, Navy, and Militia. He is given power to make treaties by and with the advice and consent of the Senate, two-thirds concurring. He is given the power to nominate, and, with the advice and consent of the Senate, appoint, ambassadors, other ministers and consuls, judges of the Supreme Court, and all other officers whose appointments are not otherwise provided for. He is required from time to time to give Congress information of the state of the Union, and to recommend for their consideration such measures as he believes to be wise and necessary. It is also provided that the President, Vice-President and all civil officers may be removed on impeachment for and

STUDY OF THE HUMAN BODY

HISTORY OF THE SUBJECT: 212.

Divisions:

a. **Anatomy**, which explains the structure of the body 67.
b. **Physiology**, which explains the vital activities 1486.
c. **Hygiene**, which treats of the preservation of health 905.

I. ANATOMY:

1. THE SKELETON: 1763.

- a. **Bone:** the hard material of the skeleton 242.
- b. **Cartilage:** the gristle or soft bone: 806.
- c. **Skull:** the hard framework of the cranium 1764.
- d. **Hand:** 833.
  - (1) The carpus or wrist, with 8 b
  - (2) The metacarpus or palm, w bones.
  - (3) The digits or fingers, wit phalanges.
- e. **Foot:** 690.
  - (1) The tarsus or ankle.
  - (2) The metatarsus or instep.
  - (3) The phalanges or toes.

2. THE MUSCLES: 1283.

- a. **Voluntary or striated:** which are controlled by the
- b. **Involuntary or smooth:** not controlled by the w
- c. **Heart muscle:** striated and branched.
- d. **Belly:** the middle part of the muscle.
- e. **Tendon:** the ends of the muscle.
- f. **Origin:** the end attached to a fixed bone.
- g. **Insertion:** the end attached to the moving bone.

3. THE SKIN:

- a. **Epidermis:** or outer skin composed of cells 1764.
- b. **Dermis:** the inner and true skin 1764.
- c. **Sweat glands:** which open through the skin 1764
- d. **Hair:** which grows from the epidermis 824.

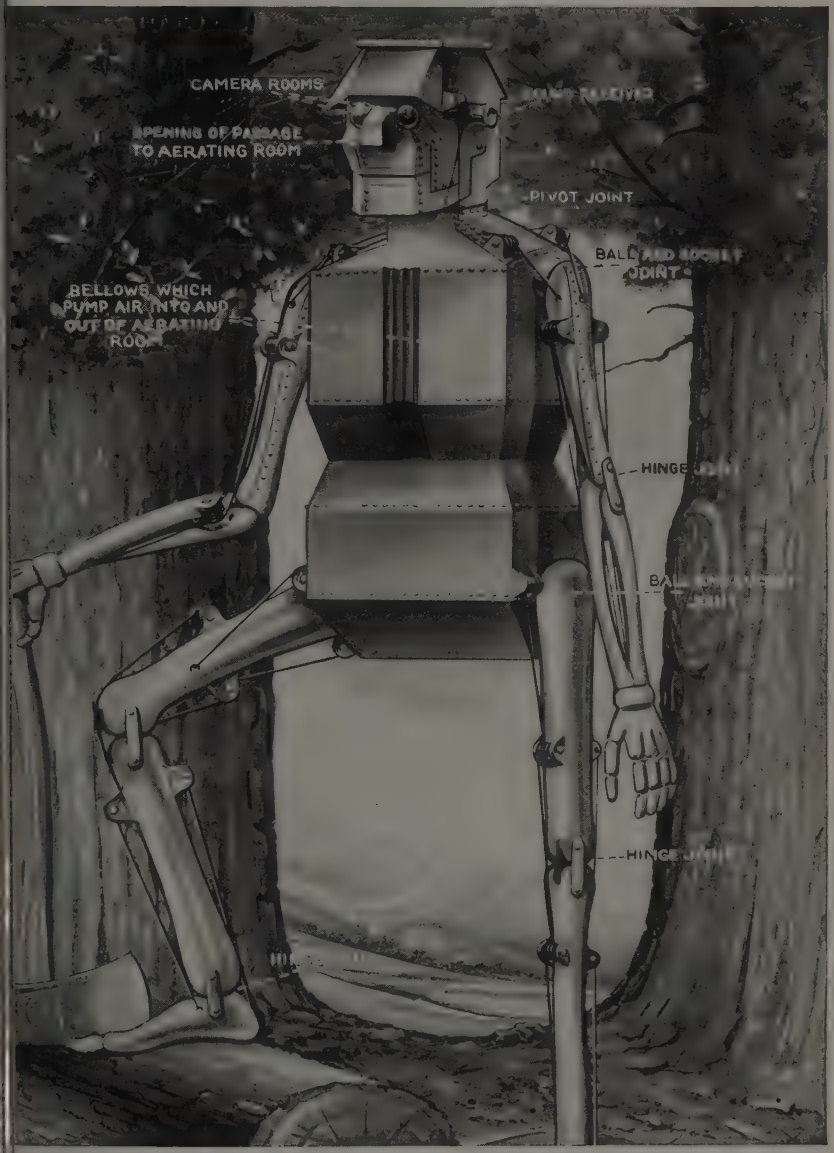
4. THE NERVES: 1320.

- a. **White tissue:** which is composed of fibers.
- b. **Gray tissue:** which is composed of nerve cells.
- c. **Sensory nerves:** made up of sensitive fibers.
- d. **Motor nerves:** made up of motor fibers.
- e. **Tropic nerves:** which regulate nutrition.
- f. **Secretory nerves:** which stimulate secretion.
- g. **Cranial nerves:** connected with head, heart, s and intestines.

5. THE BLOOD:

- a. **Plasma:** the fluid part of the blood 1725.
- b. **Fibrin:** fine threads contained in the plasma 1
- c. **Serum:** the liquid part of the plasma 1725.
- d. **Red corpuscles:** containing hæmoglobin which oxygen 228.
- e. **White corpuscles:** which can creep and change fo
- f. **Lymph:** which arises from the plasma in the laries 1126.
- g. **Systemic circulation:** blood going through the 228.
- h. **Pulmonary circulation:** blood going through th 228.
- i. **Portal circulation:** blood going through the liv

THE MACHINE WE LIVE IN

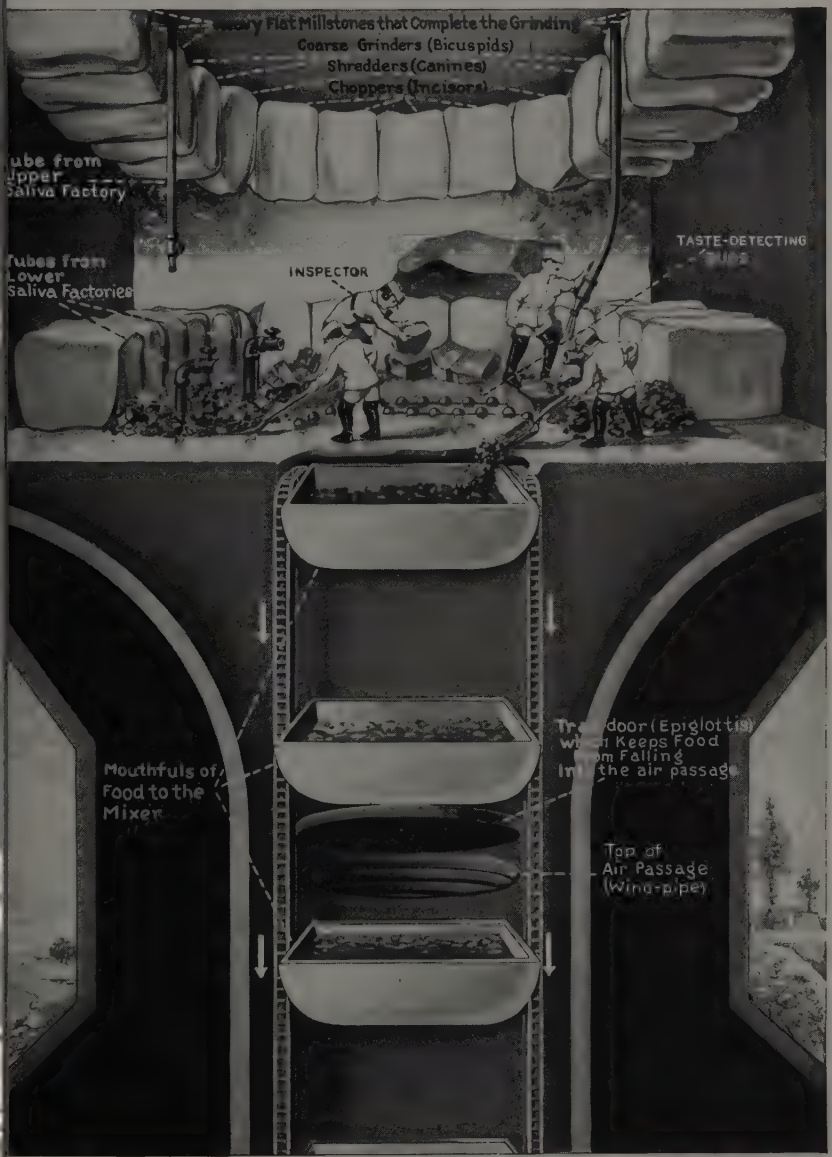


Our bodies are really machines, or rather, machine plants with a series of shops and people orking in them. These workers are the cells. They are divided into groups, and each group es only one kind of work. This picture gives you an outside view of the mechanical man with e machinery which enables him to move about and do his work in the outside world, the joints hinges of the body and the muscles by which they are worked. You also see the location of e camera, the telephone, and the bellows which keep the fires of life burning brightly.

A LOOK INTO THE EXECUTIVE OFFICES

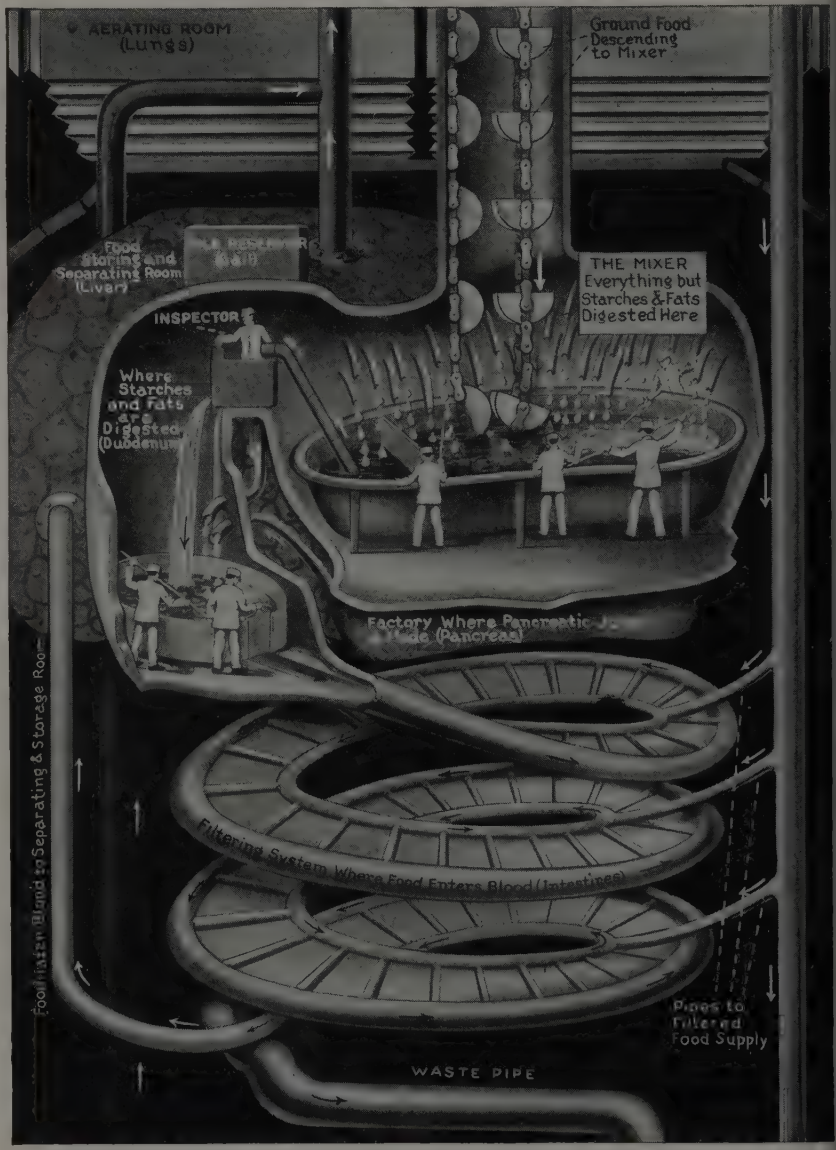
Here we are in the executive offices of the mechanical man. Notice how the central office, the cerebrum, is connected with the offices of the various assistant managers. From the head office is supervised everything except the digestive and pumping departments, which are taken care of by the managers of automatic action. One of the most curious things about this mechanical man is that he looks, so to speak, with the back of his head. The pictures are taken through the eye, to be sure, but we do not know that we are seeing anything until the report reaches the office of the receiver. In a similar way the imaginary little people in the departments of taste and smell receive these sensations and like the pictures, they are placed on file; that is to say, we cannot only taste and see things at the time, but can remember how things taste and smell and how they look. The department of hearing could not be shown in this picture because it is just on the other side of the department of taste.

WHERE THE BUSY MILLERS WORK



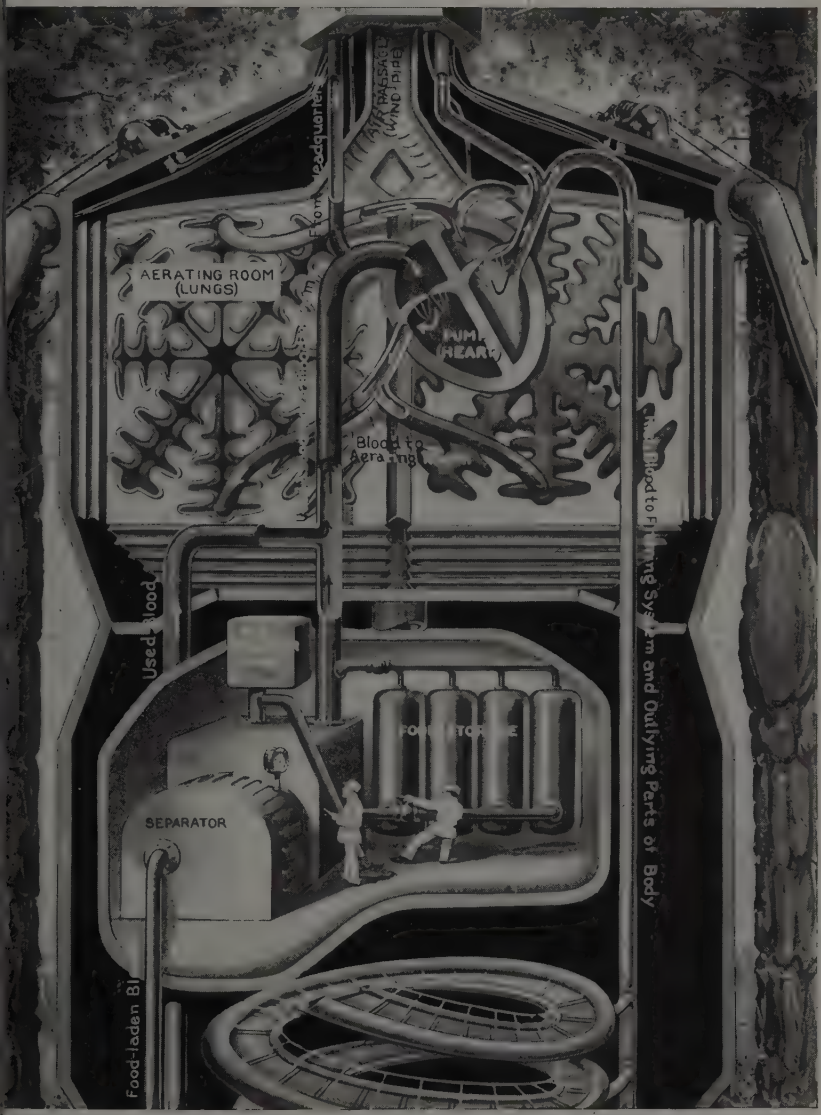
Here is the mill that grinds the food and begins digesting some of it. First the choppers cut it up into convenient size for the grinders. Next are the shredders for tearing meats. Then come the coarse grinders, and lastly, the flat stones that do the fine grinding. Those little buds tell the quality of food by the taste. Things that don't taste right are thrown out. The saliva pours in by those pipes, is mixed with the food, softens it and digests the starches. Mouthfuls of food (indicated by the carriers) pass to the mixing room and, in passing, close the door into the aerating room (the lungs) to keep you from getting things into your "Sunday throat."

DOWN IN THE MIXING ROOM


AERATING ROOM (Lungs)
Ground Food Descending to Mixer
Food Storing and Separating Room (Liver)
THE MIXER Everything but Starches & Fats Digested Here
INSPECTOR
Where Starches and Fats are Digested (Duodenum)
Factory Where Pancreatic Juice (Pancreas)
Filtering System Where Food Enters Blood (Intestines)
Food Water Blood to Separating & Storage Room
Pipes to Filtered Food Supply
WASTE PIPE

Here the food is mixed with the gastric juice which you see pouring into the mixer, the stomach, from all sides. Then it passes into the duodenum, but the inspector there stops and sends back for further treatment food not sufficiently mixed. In the duodenum the starches and fats are digested by the bile and the pancreatic juices you see coming from the two pipes. From the duodenum the food is carried into that long coiled tube representing the intestines, and as it passes along part of it is taken out and emptied in the blood, while the waste goes into the waste pipe.

AERATING, SEPARATING AND STORAGE SYSTEM



Here we follow the blood through the body, first through the separating room, or liver, which not only acts as a separator, but also stores up food to keep the body going between meals. nto the pipe leading from the separating room is emptied used blood from the lower parts of the ody and from headquarters through two additional pipes, and the common stream flows on to the eart pump, which forces it to both sides of the aerating room, where it is spread out and exposed o the fresh air for purification. Then back it goes to the left side of the pump and is sent into the ody again for use.

THE BIRD MAN AND HIS EARS

The bird-man's machine might be almost ready to tip over and he wouldn't know it, if it were not for his ears. When above the clouds, he can't see the horizon and so his eyes don't tell him when his machine is tipping. He must depend on his sense of balance located in six little tubes, three on each side of the head. We all have them, but unless they are in good working order, we could never learn to fly. They work like spirit levels. Inside of these tubes, which are filled with water, are hollow nerve fibers also containing water. When we tip our heads the water shifts and tells the brain in what direction we are tipping. So before a young man is allowed to train for flying service in the Army, he is examined very carefully to make sure he has the proper sense of balance.

OPERTIES OF MATTER: Physics 1482; science 1706; force 692; conservation 445; perpetual motion 1454.

CHANICS OF SOLIDS: 1196; 1814.

- a. **Fundamental units of measurement standards:** 1195; 1213; 570.
- b. **Gravitation:** 796; 1184.
- c. **Acceleration:** dynamics 566; inertia 925.
- d. **Laws of motion:** dynamics 567; least action 1042; centrifugal force 360; simple harmonic 1759.
- e. **Machines:** Wheel 2074; windmill 2093; screw propeller 1711; pump 1561; lathe 1034.
  1. **Lever:** 1059.
  2. **Pulley:** 1560; 228.
  3. **Inclined plane:** 917.
  4. **The Pendulum:** 1144.
  5. **General law of machines:** 567.

CHANICS OF FLUIDS: 903; 2025; 1851.

- a. **Pressure in liquids due to gravity:** pressure 1546; water-wheel 2053; siphon 1761.
- b. **Pressure due to externally applied force:** manometer 116; hydraulic motor 903; elevator 605.
- c. **Pascal's experiment:** 174.
- d. **Specific gravity:** 521.
- e. **The hydrometer:** 906.

CHANICS OF GASES: 1508; 946; 438; 1078.

- a. **Pressure of atmosphere:** 33; 72.
- b. **Barometers:** 174.
- c. **Boyle's law:** 255.
- d. **Diving bells:** 536.
- e. **Balloons and airships:** 18.
- f. **Airpump:** 34; 1997.

LECULAR MOTION:

- a. **Relative motion of molecules:** Wave motion 2058; simple harmonic motion 1759.
- b. **Vapor pressure:**
  1. **Dew point:** 526.
  2. **Humidity:** 2051; 412; 1582.
  3. **Evaporation:** 636.
- c. **Temperature:** 1886; heat 855; thermometer 1900; pyrometer 1567.
- d. **Elasticity:** 593; testing machines 1894; Hooke's law 884.

DY OF LIGHT:

- a. **Transmission of light:** light 1067; ether 627; light waves 2059.
- b. **Reflection:** 1067; dispersion 534; heliograph 859.
- c. **Refraction:** 1067; diffraction 531; diffraction grating 531; spectroscope 1793; plucker tube 1506; interference 932; polarization 1515.
- d. **Prisms:** 1550; 1125.
- e. **Optical instruments:**
  1. **Lenses:** 1053; eye 643; spectacles 1793; focus 688.
  2. **Photography:** 1476; camera 315.
  3. **Microscope:** 1220.
  4. **Telescope:** 1885; opera-glass 1386; micrometer 1220; telemeter 1883; magic lantern 1144.
- f. **Color:** 427 color photography 1477; actinism 9.

7. STUDY OF HEAT:

a. **Charles' law:** 370.
b. **Work:** Erg 623; caloric 311; heat 856.
c. **Power:** 1541; dynamometer 569; radiometer 1
d. **Energy:** force 692; geyser 762.
e. **Specific heat:** 1793; 856.
f. **Heat engines:** Gas engine 740; automobile 147; s engine 1815; governor 788; indicator 922; bine 1153; boiler 236; stoker 1830; in 926; safety valve 1652.
g. **Artificial refrigeration:** 1598; ice machines 91
h. **Conduction, convection and radiation of heat:** 855; radiation 1579.
i. **House heating:** 856.

8. STUDY OF SOUND:

a. **Sound and its transmission:** 8.
b. **Wave motion:** 2058.
c. **Velocity of sound:** 8.
d. **Reflection of sound:** 579.
e. **Loudness of sound:** 8.
f. **Pitch:** 1495.
g. **Vibration:** Acoustics 8; resonance 1602; phono 1474; voice 2026.
h. **Musical instruments:** Violin 2022; organ 1393; forte 1487; harp 841; flute 687; lute 1124; 1597; bagpipe 157; saxhorn 1685; saxo 1686; trombone 1944; cymbals 492; drum tambourine 1868; guitar 813.
i. **Harmony:** 838; music 1286.

9. MAGNETISM:

a. **Magnets:** 1145; 907.
b. **Magnetic field:** 1145.
c. **The earth as a magnet:** 1145.
d. **The compass:** 435.

10. STATIC ELECTRICITY: Roentgen rays 1624; cathode rays 351; Becquerel rays 190.

11. CURRENT ELECTRICITY:

a. **Current:** 597; dynamo-electric machines 568; meter 2029; galvanometer 731; transfo 1934; armature 104.
b. **Potential:** 1537.
c. **Resistance:** Ohm's law 598; Wheatstone's b 2074.
d. **Units of electrical measurement:** 599; power ampére 65.
e. **Cells:** Voltaic cell 597; battery 182; storage b 1833.
f. **Chemic**[illegible], **magnetic and heating effect of the cu** 5[illegible]; induction coil 923; lines of force li[illegible]tning arrester 1069; magnetic indu 11[illegible]5; thermostat 1901.
g. **Electroplating:** plating 1502; electrolysis 603.
h. **Dynamo:** 568.
i. **Motor:** electric motor 600; motor 1271; N power 1346; trolley-cars 1943.
j. **The telegraph:** 1881; wireless 1883; cable 301; phone 1884; electric lamps 599; micro 1220; photophone 1478; telephotography phonophone 1475; telautograph 1881.

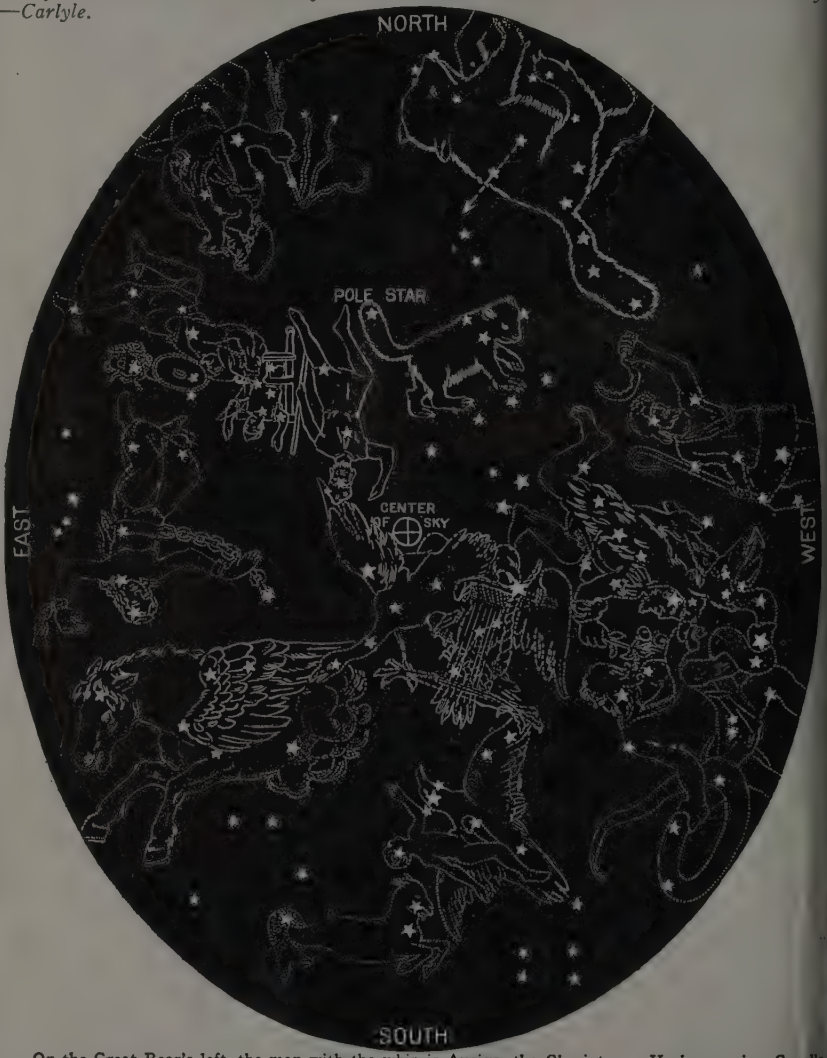
DISTINGUISHED PHYSICISTS: Archimedes 92; Galileo 730; Newton 1344; celli 1925; Huygens 902; Regnault 1598; Fahrenheit 645; C 357; Kepler 1000; Watt 2056; Davy 509; Faraday 648; M 1192; Hertz 870; Bunsen 289; Herschel 869; Kelvin 996; holtz 860; Thomson 1906; Rowland 1639; Tesla 1894; Mic 1218; Boyle 255; Gilbert 766; Bacon 154; Franklin 708; Cav 353; Galvani 731; Volta 2028; Rumford 1643; Carnot 338; C 406; Joule 980; Young 2125; Fresnel 718; Draper 551; Fraun 710; Kirchhoff 1006; Langley 1026; Newcomb 1341; Oersted **Ohm 1375; Henry 864; Weber 2062.**

THE HIGH JUMP ON THE MOON

This illustration shows the difference between the pull of gravity on different planets and on e Moon. On the Earth an athlete can jump six feet high, but on Jupiter he could only jump o and one-half feet high, because Jupiter is so much larger and the force of gravity is so much onger. However, on Mars, which is smaller than the Earth, and the force of gravity considerably s, the same athlete could jump nine feet high, and the Moon is so small that he could jump thirty t high with the same amount of effort.

Story of the Constellations

Why did not somebody teach me the constellations and make me at home in the starry heavens which are always overhead and which I do not know to this day! —Carlyle.



On the Great Bear's left, the man with the whip is Auriga, the Charioteer. He is carrying Capella the Goat, who nursed Baby Jupiter. Perseus, with his shield, carries the head of Medusa of the Snaky Locks and is about to rescue the beautiful Andromeda, who is chained to a rock. In the chair is Cassiopeia, mother of Andromeda, who after Andromeda's rescue was chained to her chair and swung round and round the pole. This constellation is the well-known "W" which you can easily find. By Cassiopeia's feet is her husband, Cepheus, King of Ethiopia. Only the head and forelegs of Pegasus, the Winged Horse, are represented in the sky. The Sea Goat with the fish's tail, is Capricornus. On the right of the picture, Bootes carries his sickle, herdsman's crook. Next is Hercules with his club. Below Hercules is Ophiuchus, the Serpent Bearer. Near the center of the sky is the Swan. Next is the Winged Lyre and below Aquilla, the Eagle, carries Ganymede to Jupiter to be his cup-bearer. It takes nearly ten years for light to travel from Albireo, the star in the swan's head, to the earth, so you will not see this star as it is when you look at it, but as it was ten years previous.

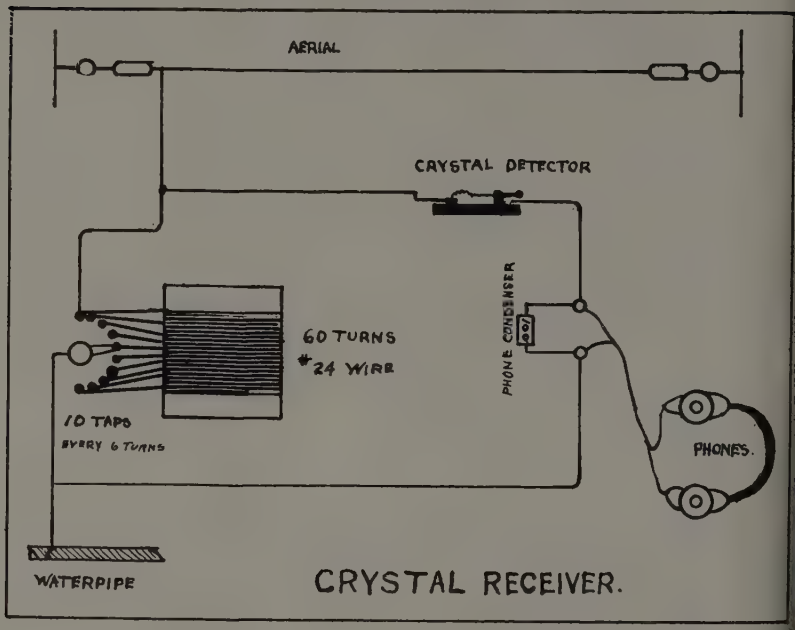
MARCONI'S OWN EXPLANATION

This is what a wireless message would look like if you could see it. It is a remarkable photograph and shows the electric waves passing along a wire at a station. They are visible to the naked eye.

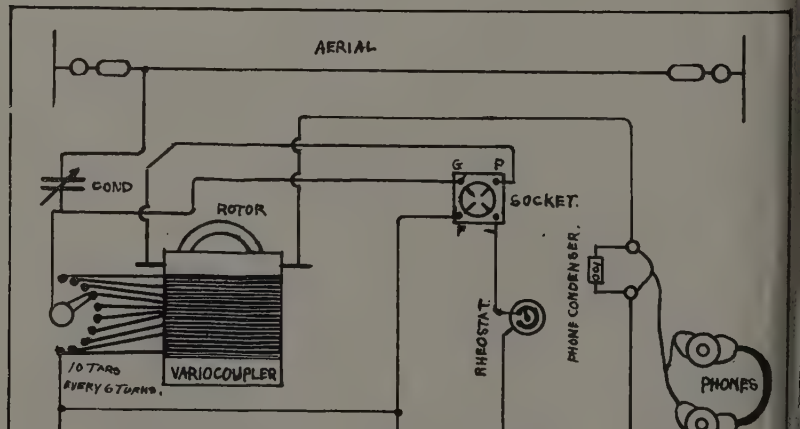
ON the right of the photograph of the wireless message is a picture Marconi, the inventor of the wireless telegraph. He says that the electric waves which carry wireless messages are like the ripples which go out in all directions when you drop a pebble into the water. Sound is also made by waves—different sounds are waves of different lengths. The waves sent out by a wireless instrument can be received only by an instrument tuned to waves of the same length. Heat, light and electricity are all forms of wave motion, and Marconi says that it will be only a step further when we shall have wireless light, heat and electric power.

On the right is shown one of the earlier "wireless" stations. The vibrations of the waves from the sending instrument are carried up into the air on these wires and go out from them in all directions. Incoming waves are caught by the wires and carried down to the receiving instrument.

This is the inside of a Marconi station. The wires shown in the picture of the station above carry the messages down, where they are received by these instruments.



CRYSTAL RECEIVER.



shore with mild lappings. When a bell per strikes the side of a bell, the whole vibrates back and forth. These vibrations not be seen readily by the human eye, they may be felt if we should touch the with our fingers. The hundreds of little lations by the bell cause the air to vibrate series of motions somewhat like the rip- of the water, only many times faster. The vibrations knock against our eardrums, d tympanums, and start them oscillating. e little motions are then carried to the n and cause us to hear the sound of the

adio works on somewhat the same prin- . Music or speech is sounded into a ally constructed phone at a broadcasting on. The phone is so constructed that ations of the sounds cause little vibrations lectrical current. These vibrations are out into the ether, and may travel thous- of miles.

ow we may consider the first part of the ving set of a radio outfit, the aerial, which wire or a series of wires that attract the rical waves sent out by the station trans- er. With the exception of the lead-in the aerial must be entirely insulated all electrical conducting materials. Por- n and rubber are good insulators. Out- aerials are preferable, providing the e or "overall" length is not over one red and fifty feet from the receiving set. ever, interior aerials are very satis- ry, and may be made by running a wire the ceiling or in a hallway; or certain s of aerials may be purchased which will d on a table. If there are any power lines e vicinity your aerial must be at approxi- ly right angles to them; otherwise induced nt may be the result. It is the func- of the aerial to catch the continuous s from the sending station and transmit , by means of a lead wire, to the set.

HE CRYSTAL RECEIVING SET

ere are many different ways of connecting io receiving set, and the sets vary greatly e number of parts used. But the general ical and working laws may be understood r by the novice if a simple set is described. ram number one illustrates such a set. e lead-in wire from the aerial is attached coil. A coil may be made by wrapping ated wiring about a non-conducting core as an oatmeal box. The other end of the s grounded; i.e., a wire leads from it to round. If there are radiators or water in your home they may be employed by hing the coil lead-out wire to the pipe ad of running a wire to the ground. From oil also a wire leads to the crystal detector, n is a piece of silicon or galena or other ying mineral. The service of the crystal tor may be explained in this manner. The rical vibrations which come from the to the aerial and coil are of high frequency—making many thousands of vibrations each second. The current is alternating; that is, it may be considered as changing from positive to negative (plus to minus) at a very high rate. The crystal detector will permit only one variety of the current to pass through it. Thus it serves as a rectifier; and the electricity, having passed through the crystal, is called pulsating direct current.

From the crystal the current passes through the receiver and is then conducted to the ground wire. A telephone or telegraph receiver may be used. The physical principles of this apparatus may be quickly explained. In passing into the receiver the electrical current is conducted through a coil, through which runs a core which the current magnetizes. Since the current is pulsating, the core becomes an intermittent magnet whose oscillating charges vibrate a tympanum or drum. The principle is seen with the eye in the case of a vibrating clapper of an electric door bell. Air vibrations caused by the oscillating tympanum of the receiver enter the ear, and we have reproduced the sound practically as it emanated miles away.

A phone condenser may be attached to the wire leading into, and the wire leading away from, the receiver. It is generally a series of metal plates which are separated by a non-conducting material such as mica, air, paper, and so forth. Its effect is to prevent any stray vibrations, "unsmoothed" by the crystal, from entering the receiver.

THE ONE-TUBE RECEIVING SET

The crystal set described above is very limited in its scope, and will catch only local programs. The average practical set has a more complicated coil apparatus consisting of a primary and a secondary coil. The secondary receives an induced current from the primary and produces a stronger effect. Fainter vibrations than can be detected by a crystal rectifier are received and enlarged by vacuum tube detectors. Some sets have several primary and secondary coils, several vacuum tube detectors, and several condensers. The vacuum tube detector is built somewhat on the principle of the incandescent electric light bulb. In the center is a filament that is lighted by what is termed the "A" battery. About the filament is wound a threadlike grid, which does not touch the filament. The grid is surrounded, though not connected, by a plate. Another battery, called the "B" battery places a positive charge on this plate. The negative pole of the "B" battery is attached to the "A" battery. Since the plate is charged positively, only the negative ions are received through the non-conducting spaces of the vacuum tube. Thus the effect is the same as that of the crystal detector except that the tube is much more sensitive, and the vibratory forces are assisted by the current supplied in the set. The charges of pulsating direct current from the plate are carried to the receiver.

all the simpler acts of human skill are learned; as grasping, standing, walking, etc. If the learner possesses intelligence enough to imitate, he can shorten the method of trial-and-error by copying the successful acts of others. Imitation, by which older children acquire advanced types of skill, as piano playing, use of tools, etc., does not abandon the trial-and-error method, but simply aids it in assisting practice. The reasoning method consists in solving a new situation by applying one's previous knowledge. This method of thinking instead of blindly experimenting is only employed by the most intelligent beings.

The simplest methods of teaching mankind, that is, rendering shorter and easier the process of trial-and-error, are to present a model for imitation, or to explain how the act should be performed. These methods, however, will not suffice when the aim is to prepare the child to solve the problems he will meet in his later life. The utmost art of method must be used in order that education may help life, and learning lead to practice. The two principal criticisms of the old-fashioned school method are: first, failure to provide a proper and adequate motive for learning, instead of which pure school motives such as fear of punishment and rivalry are used; second, failure to apply acquired knowledge to actual life problems.

Reformers of method have met the first criticism by developing interest in school work, and the second by the adoption of certain devices of which the most important are the correlation of subjects, and the inductive method. The latter is based on the idea that the aim of all instruction is the mastery of general concepts, principles, or laws, because only in generalized forms can knowledge be applied to new conditions. But to be able to recognize the principle, when conditions vary, the learner must first master the principles by starting from the concrete facts upon which the principles are based, and by his own insight discern the generalization involved. Moreover, he must be practiced in the application of these principles. In accordance with these requirements the so-called "formal steps" have been evolved by Herbart, Ziller, Rein, and Charles and Frank McMurry. They constitute the method of the recitation, and may be described as follows. First, the subject of study for the lesson is announced. Second, preparation is undertaken, in which pupils tell what they know concerning the lesson. Third, presentation is developed, in which unsettled questions are attacked; this may take the form of lecture by teacher, study of text, or original efforts by pupils by means of excursions, laboratory experiments, etc. Fourth, comparison is suggested; facts similar to those studied are recalled and compared. Fifth, generalization is made, in which principle behind fact is deduced. Sixth, application is worked out to insure that the principle of step five will be employed to explain new cases. This treatment may require several les periods, and is called a lesson unit.

Along these lines of educational thought systems have developed three plans:

SOCIALIZED RECITATION.
PROJECT METHOD.
SUPERVISED STUDY.

Supervised Study. The aim of Supervi Study is to abolish the system by which teacher merely assigns the lesson at school, a later hears the recitation, leaving the prepa tion to be done away from the instruct guidance. As this system has been genera worked out, the first ten minutes of an h recitation period are spent in rapid review previous day's lesson. The next forty minu are given to the study of the new lesson un teacher's supervision. The work is first c fully explained and general difficulties poin out. The children then study the lesson, teacher assisting individual pupils. The fi ten minutes are devoted to general discuss or statement of next day's assignment.

The Project Method. The project i vitalized method of connecting school infor tion with real life. A worth-while proble suggested either by a pupil or the teacher, class works out the solution in a natural w The problem must be of such character tha working it out the children will of neces learn the knowledge demanded by the curr lum. The teacher's function is to offer sug tions and tactfully guide the work, never in fering with the initiative of the pupils. A ject may cover any length of time; some req only one lesson period, while others ex over several weeks. The following are illustrative project suggestions. 1. An worn-out automobile could be restored in metal shop. 2. In developing interest in le writing, one could start with the beginnin the United States mail service and trace development, bringing in various departm and showing necessity for rules in addres etc. Some good books on the subject *Project Method*, Wilson; *Project Work Education*, Stockton; *A Project Curricu* Wells; *Project as a Teaching Unit*, Snedden

Socialized Recitation. Socialized Recit is a recitation participated in and condu by the pupils. The teacher may offer ad and assist in the preparation previous t recitation. The object of the socialized is to offer greater opportunity for self-ex sion, and to develop dignity and self-co since pupils are honor bound to discuss lesson helpfully, courteously, and well a themselves. The teacher often assumes role of a pupil.

In the field of general interest Prof Dewey suggests that the motive by interest should be secured comes through ipation of application. To get this n and dependent interest, his method is to the school room a little society in which

e. Influence of Rousseau, Herbart and Froebel on modern education: 932.

6. CHILD STUDY:
   a. Study of mental and physical nature of children in modern education: 384.
   b. Work of Rousseau, Pestalozzi, Herbart and Froebel: 384.
   c. Culture-epoch theory of Ziller: 384.
   d. Theory of G. Stanley Hall: 385.
   e. Preyer's "The soul of the child": 385.
   f. Learning by doing: theories of Dewey and Angell: 385.
   g. Development of perception: 385.
   h. Place of play in education: 385.

7. ADOLESCENCE:
   a. Transition from childhood to adult life: 14.
   b. Physical changes characteristic of this period: 14.
   c. Mental and emotional traits: 15.
   d. Late adolescence period of change from dependence to independence: 15.
   e. Called the stress and strain period: 15.
   f. Professor James' advice: 15.
   g. Practical problem of the educator: 15.

8. SELF ACTIVITY:
   a. Instincts, impulses and interests: 1720.
   b. Emphasized by Froebel school: 1720.
   c. Relation of the will: 1720.
   d. Self activity basis of the will, effort and interest: 1720.
   e. How developed: 1720.
   f. How to be treated by teacher: 1720.

9. HABIT:
   a. Definition of term: 821.
   b. How distinguished from instinct: 821.
   c. How habits are established: 821.
   d. Relation to brain and nerve action: 821.
   e. Function and value of habit: 821.

10. MENTAL DISCIPLINE:
   a. Value in developing power of mind: 1203.
   b. Disciplinary value of certain studies: 1204.
   c. Opposing views of Herbart: 1204.
   d. Discipline a factor in choosing school curriculum: 1204.
   e. Value of correlation: 1205.

11. MEMORIZING:
   a. Place in early system of education: 1201.
   b. Change of method in modern education, but aim the same: 1201
   c. Memory differs in degree and kind: 1201.
   d. Methods of memorizing mechanical and associative: 1201.
   e. Mnemonic systems: 1201.
   f. Logical associations most effective: 1201.

. SCHOOL ORGANIZATION AND MANAGEMENT:

1. WHAT THE SUBJECT INCLUDES: 1691.
2. MATTERS CONCERNING THE SCHOOL BUILDING:
   a. The erection of the school building: 1699.
      (1) Selection of the proper site.
      (2) Aid to be obtained from the state in designing
   b. School sanitation: 1691-92.
      (1) What is included in the subject: 1691.
      (2) Heating and ventilation: 1692.
      (3) Problem of providing for sufficient light: 1692.
      (4) Need of having adjustable seats and desks: 1692.

3. ORGANIZATION AND CONDUCT OF THE SCHOOL:
   a. The course of study:
      (1) Correlation of the course of study: 460.
         (a) What is meant by correlation: 460.
         (b) The views of Herbart, Froebel and Dewey: 460.
         (c) Subjects which may most easily be correlated: 461.
   b. Discipline and punishment:
      (1) Theory of punishment in general: 1562.
      (2) The proper aim in punishment in school: 1563.
      (3) Partial solution of the problem:
         (a) In activity and interest of children in the school: 1563.
         (b) In self-government: 1563.

4. THE SCHOOL GARDEN: 1504, 1690.
   a. Relation of the school garden to regular school study: 1690.
   b. Values to be realized by use of garden: 1691.
   c. Relation of the garden to the home of the children: 1691.
   d. Manual training in the care of the school garden: 1691.
   e. The garden in the teaching of nature study: 1690.

5. PROBLEMS OF SPECIAL TYPES OF SCHOOLS:
   a. Rural Schools: 1697.
   b. Summer Schools: 1702.
   c. Schools for Defectives: 1703.

IV. METHODOLOGY.

1. METHOD IN THE TEACHING OF ARITHMETIC:
   a. The Subject-Matter of Arithmetic:
      (1) The essential subjects to be taught in arithmetic: 97.
      (2) Why it is advisable to drop certain subjects commonly taught: 97.
      (3) The test of a good topic: 98.
      (4) What some of the new valuable subjects are: 98.
      (5) The change in recent text-books: 98.
   b. The right aim in teaching arithmetic: 98.
   c. The significance of the answer to a problem:
      (1) How far the answer should be emphasized: 98.
   d. Value of interest in a problem:
      (1) The effect of interest on concentration of attention: 98, 932.
   e. Arithmetic teaching in the first two grades:
      (1) Informality of the subject in the first year: 98.
         (a) Reasons for this: 98.
      (2) How counting should be taught and utilized: 98.
      (3) Measuring and what it should involve in the first two years: 98.
      (4) Teaching of fractions:
         (a) Why teach them early: 98.
         (b) Devices to make the steps clear: 98.
      (5) Method in subtraction: 98.
   f. Arithmetic in the third, fourth, and fifth grades:
      (1) Reduction, ascending and descending: 99.
         (a) To what this should be confined: 99.
      (2) Decimal fractions: 99.
         (a) When decimal fractions should be taught: 98.
         (b) The best methods of teaching multiplication and division of decimals: 99.
   g. Arithmetic in the sixth and seventh grades.
      (1) Where the main value in the arithmetic work here lies: 99
      (2) Importance of correlation: 99.
      (3) How to teach percentage: 99.
      (4) Use of equation in arithmetic: 99.
      (5) Place and value of oral work: 99.
      (6) How to emphasize the thought side of a problem: 99.
      (7) Confusion arising from home help: 100.

THE MONTESSORI DEVICES

HAT THEY ARE AND HOW TO USE THEM IN THE SCHOOL AND HOME

R. MARIA MONTESSORI, founder of the Montessori tem, began her career in the dical profession. The only ghter of middle class parents, liant and ambitious, she was first woman to obtain a med- degree from the University Rome. Making a specialty hildren's diseases, she became ctor of an institution for the ple minded. It was in con- tion with this work that she developed her system and ame interested in its possibil- s as applied to normal chil- n. She resigned from the itution and became a student hilosophy in the University Rome, specializing in child chology and visiting primary ools. In January, 1907, she ned in Rome the first Case Bambini, or "Children's use." Her work almost im- diately attracted wide atten- n.

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DR. MARIA MONTESSORI
Here is "the only example of an educational system inaugurated by the feminine mind."

n 1911 Switzerland established the Mon- ori system in its schools, and E. G. C. mes, the chief inspector of the elementary ools of England, as a result of personal estigation, said to Dr. Montessori:

She is great because she has discovered Froebel's ter principle for herself, and in so doing has inter- ed it anew . . . . In theory Froebel left much to child's initiative; in practice, comparatively little.

The Montessori system is part of the course nstruction in many leading normal schools Canada and its importance is widely recog- ed by educational leaders in the United States where its adoption is being promoted under the auspices of the Montessori Educational Association of Washington, of which Mrs. Alexander Graham Bell is President and Dr. Claxton, U. S. Commissioner of Education, Miss Margaret Woodrow Wilson, John A. Brashear, Chairman of the Educational Fund Commission of Pittsburg, and William E. Davidson, Superintendent of Education of Pittsburgh, members of the Board of Trustees.

THE SYSTEM

Teaching by the Montessori system begins with devices most directly related to the child's daily life—as those for teaching the lacing of shoes and the buttoning of dresses. Thus the occupations of home and school constantly review, supplement and emphasize each other.

Teaching Through the Fingers: One of the first steps is to train the finger tips. For example, the child learns the "feel" of letters made of sand paper and pasted upon cards. In these exercises movements are always from left to right, because of the preparation thus afforded for writing. Stress is laid upon the training of the finger tips because up to the age of six, children see imperfectly and because, up to this age, the brain is best educated through the fingers; hence, in part, their eagerness to help vision by feeling—an instinct which is either a nuisance or an education, in proportion as it is, or is not, applied under the guidance of an adult.

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CHILDREN USING COUNTING AND GEOMETRICAL DEVICES.
The child on the left is placing figure cards over the corresponding number of counting sticks; on the right is fitting geometric insets into corresponding holes. His eyes are closed and he decides which hole the cylinder will fit, solely by sense of touch.

CHART 1 **1375 SCHOOL SUPERINTENDENTS WOULD SUGGEST:***
Elementary School Curriculum

	First Choice	Second Choice	Third Choice
Add courses in citizenship	622	255	157
Add athletics and physical training for all	459	434	219
Add courses in morals and manners	322	233	322
Add religious instruction through the churches	212	123	207
Drop numbers and arithmetic in grades 1 to 4	39	51	38
Drop sewing, cooking, and manual training	40	45	61
Drop medical inspection and health work	4	15	17
Drop penmanship after grade 6	56	24	93
High School Curriculum			
Add athletics and games for all	605	262	212
Add rigid medical inspection and health work	439	361	104
Add courses in comradeship and mate-seeking	50	63	59
Add religious instruction through the churches	232	135	154
Arrange part time employment in stores, factories or farms with laboratory credits	194	135	164
Drop foreign languages	71	54	98
Make half the English work printing and reporting	56	54	94
Drop useless experiments in physics and chemistry	147	80	201

To read: Out of 1375 superintendents replying as to elementary course of study, 622 indicated first choice as addition of citizenship courses, 255 gave this as their second choice, and 157 as a third choice.

CHART 2 **AVERAGE TIME ALLOTMENTS, IN MINUTES PER WEEK FOR 49 CITIES OF OVER 100,000 POPULATION***

	GRADES								
Subjects Taught	1	2	3	4	5	6	7	8	**Total**
Language	130	141	167	176	187	194	207	215	1417
Reading	421	404	332	245	182	141	142	136	2003
Spelling	39	82	87	85	82	78	72	73	598
Penmanship	67	72	77	78	77	75	63	58	567
Arithmetic	64	143	193	206	211	211	212	211	1451
History	17	19	30	54	84	97	148	167	616
Civics	9	12	11	12	14	15	23	27	123
Geography	11	14	59	137	156	162	137	84	760
Science	22	23	23	23	21	21	22	26	181
Hygiene	16	16	18	22	27	27	25	22	173
Physical Training	90	87	89	90	90	89	98	104	737
Supervised Play	22	19	18	14	16	16	16	15	136
Recess	105	105	106	96	91	90	84	74	752
Industrial Arts	22	22	25	30	50	65	90	106	410
Drawing	87	88	87	86	82	75	77	79	661
Music	71	74	74	77	76	74	70	75	591
Miscellaneous	97	93	99	97	99	98	88	87	758

Language includes composition and grammar; reading includes phonetics, literature, stories, dramatics; science includes nature study and gardening; industrial arts includes hand work, wood and metal work, domestic science, etc.

CHART 3 **AVERAGE TIME DISTRIBUTION IN 14 REPRESENTATIVE JUNIOR HIGH SCHOOL SYSTEMS***

Year	A	Art	Eng.	Home Eco.	Geog.	Indust. Art	Math.	Music	Science	Health	Soc.
Seventh	A	82.9	302.8	180	164.6	175.8	237.9	70	132	150.2	240
	B	5.2	19.5	11	10.5	10.3	13	4.2	7.7	9.2	15.1
Eighth	A	85	269.8	125.2	152.5	169	242.2	67.6	178.3	157.1	248.4
	B	5.4	16.2	7.7	9.7	9.8	14.3	4	10.5	9	14.4
Ninth	A	120	265.7	335	.....	183	303.7	72.3	195	147	190.7
	B	7.5	17.2	17.1	.....	11.5	18.3	4.3	11.6	8	10.9

A is number of minutes per week. B is proportional distribution in percentages.

*Above charts are from the Second Yearbook of the Department of Superintendence of the National Education Association of the United States. Table 2 was compiled by Fred C. Ayer, Director of Research, Seattle Public Schools, and is an adaptation in this form. Table 3 was compiled by James M. Glass, Director of Junior High Schools, State Department of Education, Pennsylvania.

Related Topics): Montessori Systems, Schools (Elementary and Rural); Teaching (Project Method, Supervised Study); Normal Schools; Schools, Secondary; Education; Pedagogics; Public Schools, *The New Student's Reference Work.*

mind or, in more general terms, of man's immaterial nature. The dividing line between mind and matter cannot be definitely drawn, because neither can be accurately defined; but our reason plainly teaches that there is a fundamental difference, notwithstanding the intimate relation each sustains to the other. To escape the difficulty of distinguishing properly between mind and matter, one school of extremists, whose chief apostle was famous Bishop Berkeley, maintains that mind is the only reality in the universe and that all external or visible objects at most are but expressions or manifestations of mental states. Another school, much more numerous, regard all mental acts and states as mere qualities of matter or, at most, as mere results of the *force* with which matter has been endowed. Thought, feeling, volition, this school tells us, are the product or output of man's brain and physical organization, as a flame of heat is the output of a fire or as rays of light are the output of the sun, under all the physical conditions to which it is subject. It ought to be a sufficient answer to both these schools, that we are conscious of living both in a material realm and in one that is not material; we know that there is an external world, and we also know — to use the language of Scripture — that there is a spirit in man; we know that we have bodies made of flesh and bone and blood, and we also know that we have a *being* that is not flesh or bone or blood; we know that we have "senses, affections, passions;" and we know, too, that we have qualities within us that unite us to the unseen and the eternal. "I am a spirit inhabiting a body."

The division of the mental faculties which is now generally accepted is threefold; the intellect; the sensibilities or emotions; and the will. Under each of these are numerous subdivisions. Of late years the science of psychology or mental philosophy has received a large measure of attention; not only in schools and colleges, but from the general public; and we can only refer the reader to the various essays and textbooks — their name is legion — that have been written and published on the subject. See *Elementary Psychology* by Sorley and Höffding's *Outlines of Psychology*.

Psychology for Teachers. The great movement for the professional training of teachers in the latter part of the 19th century was based on the idea that back of education lies a method that can be understood only by those who are versed in psychology. Educational reformers have for nearly three centuries been placing some emphasis on this idea, but only recently can it be said to have become a moving force with a large number of the ank and file among the teachers. During the last 20 years, however, the belief came to be very generally entertained that psychology, especially physiological and experimental psychology and child-study would revolutionize education. The new education based on these was, in contrast with the old education, to be authoritative and scientific. Perhaps the most notable advocate of this view is President G. Stanley Hall. On the other hand, many psychologists, especially Professors James and Münsterberg, maintain that these hopes are extravagant and that the new psychology, based on physiology and experiment, so far from being likely to revolutionize education, has even less to offer for the guidance of the teacher than the old psychology. Moreover, they regard a knowledge of the old psychology, as, although possibly helpful, by no means indispensable.

In the development of psychology the original movement toward the utilization of mathematics, experiment and scientific methods generally is due to Herbart. To him the most important application of psychology was to education. He founded the positive part of his educational practice on a psychology that did not differ in method essentially from the old except in an untenable employment of mathematics. To careful observation he looked for the discovery of individual differences and abnormalities that hinder the success of that method of teaching which for the average student is psychologically sound.

It must be confessed that physiological and experimental psychology and even child-study have so far not given to education much that is of such specific application as to make it a science like engineering. In a general way, however, the new psychology and, especially, its spirit of scientific criticism and method have modified and are modifying the attitude and method of teachers in a way that promises to be revolutionary. Moreover, we are learning what we may hope for from psychology. That the study of children will reveal what to teach we have come to doubt. The end of education is no longer thought to be merely general mental discipline or "harmonious development of all the powers." It has come to be conceived as efficiency or adjustment to the conditions of life. Though psychology can reveal the powers of the mind and the laws of their development, it can not show the social and industrial conditions with which these powers should be prepared to deal. But when once we have settled what should be taught, we may look to the psychologist to tell us the proper order and method of presenting it.

Among the most important effects of general psychology upon education may be mentioned the inductive method, involving the method of development (compare TEACHING, METHOD OF) and the recognition of the importance of interest (*q. v.*) in

ground clay, a pair of scissors, a few skeins of colored worsted, a few skeins of carpet-yarn for weaving mats, a few sheets of perforated figure-papers, a few pounds of raffia for weaving baskets, a paper of large needles and six weaving-needles.

The object of stick-laying is to teach spacing, design, arrangement and orderliness. The paper-folding gives practice in the simplest hand-movements and in the use of the inch-measurement. Tracing on the back of the colored papers over the creases gives practice in precision and accuracy. Working out figures with worsted in perforated paper helps to fix forms and co-ordinates eye-pictures and finger-movements. Clay-modeling develops the idea of form and cultivates the sense of touch. The weaving serves many of these purposes and in the succeeding grades makes an excellent introduction to industrial occupations.

The course is arranged for two 15-minute periods per week; one in clay-modeling and one in stick-laying or paper-folding.

The work is planned for 23 weeks; the numbers refer to the number of week, and the letter to the lesson.

1. (*a*) After conversation on the sphere, model the sphere, using fingers only.

(*b*) Measure side of four-inch red square.

2. (*a*) Model a spherical object.

(*b*) Lay red sticks to form a border illustrating repetition.

3. (*a*) Model a spherical object.

(*b*) Measure side of four-inch orange square. Fold, making a diameter. Teach diameter. Measure distance from end of diameter to corner. Fold, forming a diameter at right angles to the first diameter. Trace on the back of paper over the creases, making a cross.

4. (*a*) Model a cube.

(*b*) Lay orange-colored sticks to illustrate repetition of twos.

5. (*a*) Model a cubical object.

(*b*) Fold a four-inch yellow square so as to form 16 one-inch squares. Measure the squares. Trace on back of paper over the creases.

6. (*a*) Model a cubical object.

(*b*) Lay yellow sticks illustrating the repetition by threes.

7. (*a*) Model an isometric cylinder.

(*b*) Fold a green square to form a diagonal. Fold to form a diagonal at right angles to the first. Make six folds parallel to one of the diagonals, making equal spaces. Trace on the back of paper over the creases.

8. (*a*) Model an isometric cylindrical object.

(*b*) Lay green sticks to illustrate alternation.

9. (*a*) Model an isometric cylindrical object.

(*b*) Fold blue square same as in les on 7(*b*) and in addition fold six creases parallel to the other diagonal, thus forming small squares. Trace over some of the creases to make a design, which shall be symmetrical.

10. (*a*) Model a cylindrical object with rounded ends.

(*b*) Lay blue sticks to illustrate oblique alternation.

11. (*a*) Model an object like cylinder.

(*b*) Fold a violet square as in lesson 9(*b*) and trace pin-wheel design on creases.

12. (*a*) Model an object like cylinder.

(*b*) Lay violet sticks in design as a modification of 10(*b*).

13. (*a*) Model a sphere and bisect it with a string.

(*b*) Fold red square as 9(*b*) and trace symmetrical design on creases.

14. (*a*) Model a hemispherical object.

(*b*) Lay red sticks to form a Greek border.

15. (*a*) Model a hemispherical object.

(*b*) Fold a diameter in an orange square. Make six folds parallel to the first diameter Form the same number of folds at right angles to the first set, thus making 64 quarter-inch squares. Draw a symmetrical design by tracing over the creases.

16. (*a*) Model a square prism and bisect across corners, forming a triangular prism.

(*b*) Lay orange sticks to illustrate alternation.

17. (*a*) Model a square prismatic object.

(*b*) Fold a diagonal in a yellow square and also seven creases parallel to it. Fold a set at right angles to the first Draw symmetrical design on creases.

18. (*a*) Model a triangular prismatic object.

(*b*) Form a flag with three yellow sticks

19. (*a*) Model a cylinder and bisect it

(*b*) Draw the diameters and diagonals on the back of a blue square. Connect the end of the diameters in such a way as to form a square. Cut on the lines with scissors, making 16 right-angled triangles.

20. (*a*) Model a hemicylindrical object.

(*b*) Make two borders using eight triangles of lesson 19(*b*) and blue sticks These may be mounted.

21. (*a*) Model a hemicylindrical object.

(*b*) Draw on back of blue square two sets of parallel lines at right angles to each other, forming 16 one inch squares. Cut with scissors.

22. (*a*) Model cylinder with rounded ends. Bisect it.

(*b*) Arrange seven squares of lesson 21(*b*) in borders.

23. (*a*) Model a hemicylindrical object.

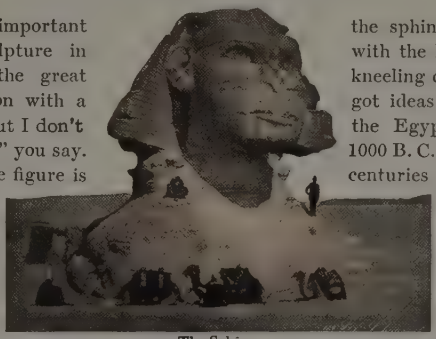
(*b*) Make a design of blue triangles — of lesson 19(*b*) — and blue squares — of lesson 21(*b*).

The knife and a few other simple tools are introduced as the work advances, and habits of originality, accuracy, precision and speed are inculcated throughout the course. The views of specimens of work done in grades seven and eight show how the skill of the pupil develops through the years.

Poems in Stone

Great Works of the Ancients

THE oldest important piece of sculpture in existence is the great Sphinx, a huge lion with a human head. "But I don't see any lion's body," you say. That is because the figure is half-buried in the desert sand. Compare the height of the man standing under the chin, with the face of the sphinx, and its breadth with the length of the three kneeling camels. The Greeks got ideas of sculpture from the Egyptians as early as 1000 B. C. It took them many centuries to bring sculpture to the perfection of the Venus, the Winged Victory and the noble figures of the Parthenon.



The Sphinx

Original in the Louvre, Paris
Venus de Milo

Louvre
The Winged Victory

From the Frieze of the Parthenon
The Panathenaic Procession

Poems in Stone

The Works of Modern Masters

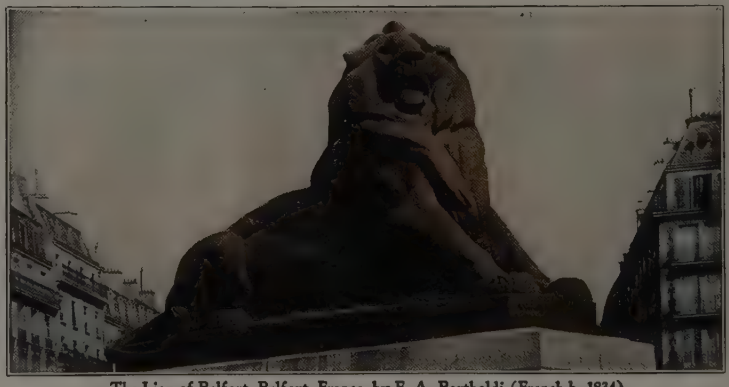
ON this page we pass to modern sculpture.

What an inspiring note we have in this beautiful "Laughing Boy" by Donatello—a perfect type of the happy childhood at which modern education, among other things, aims. The original is in Florence.

The Lorenzo de Medici is also called "The Thinker." Compare this cultivated, aristocratic nobleman with Rodin's "The Thinker"—primitive man gazing at his descendants in Dante's "Inferno." How far man has progressed *materially* since his time; how slow man's progress in *moral* civilization!

Thistle Print, Detroit Publishing Co.
Lorenzo de Medici, by Michelangelo
(Italian b. 1475)

Rodin Museum, Paris
The Thinker, by Auguste Rodin
(French b. 1840)



The Lion of Belfort, Belfort, France, by F. A. Bartholdi (French b. 1834)
Commemorates gallant and successful defense of the town in Franco-German War.

The Madonna and Motherhood

Church of the Annunziata, Florence
The Madonna of the Sack, by Del Sarto
(Italian b. 1487)

THIS page, devoted to Old Masters, also illustrates the development of art toward the style of the moderns as given on the next page.

Royal Gallery, Dresden, Germany
The Sistine Madonna, by Raphael
(Italian b. 1483)

Royal Gallery, Dresden
The Holy Night, by Coreggio
(Italian b. 1495)

Darmsdadt Museum, Germany
The Meyer Madonna, by Hans Holbein the Younger
(German b. 1495)

Louvre
The Immaculate Conception, by Murillo
(Spanish b. 1617)

Motherhood in Art

THIS page shows how modern artists depict the Madonna and further emphasizes the idea of the divinity of all motherhood, bringing it down to everyday life in the painting of "Madame Le Brun and Her Daughter" and "Her Son," by Miss Walker. The head of the Virgin is by Franz Ittenbach (German b. 1813).

© *Horace K. Turner Art Co., Boston*
Metropolitan Museum, New York
Madonna of the Rose, by P. A. J. Dagnan-Bouveret
(French b. 1852)

Luxembourg
The Consoling Virgin, by W. A. Bouguereau
(French b. 1825)

Louvre
Madame Le Brun and Daughter, by M. L. E. Vigee Le Brun (French b. 1755)

Art Institute, Chicago © *N. V. W.*
Her Son, by Nellie Verne Walker
(American b. 1874)

Natural History in Art

Work of the Animal Painters

©, *Turner Art Co., Boston*

Saved, by Sir Edwin Landseer
(English b. 1802)

© *Turner Art Co.*

Cat and Kittens at Play, by Julius Adam
(German b. 1852)

Luxembourg

The Escaped Cow, by Julien Dupre
(French b. 1851)

Metropolitan Museum, New York

The Horse Fair, by Rosa Bonheur (French b. 1822)

Photograph by Soule Art Co., Boston

National Gallery, Berlin

One of the Seven, by Otto Gebler (German b. 1838)

National Gallery, London

Dignity and Impudence, by Landseer

A big dog always seems to be "on his dignity" in the presence of a little dog!

Notice the swallow perched on the boy's hat, the morning sunshine streaming through the opening which you cannot see and the cracks in the door which you can see. How troubled and restless the sheep look! They are anxious to get out to their breakfast. (See SEVEN SLEEPERS.)

Land, Sky and Sea in Art

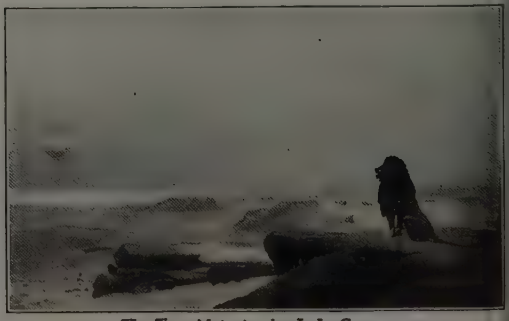
By Permission of Berlin Photograph Co., New York
The Crabfishers, by Bernardus Blommers
(Dutch b. 1845)

The Life Savers, by Georges Haquette
(French b. 1850)

Avenue of Trees, by Hobbema
(Dutch b. 1638)

COMPARE the great variety in this page group—the quiet waters in which the Crabfishers are working, the stormy sea, the quiet Dutch landscape, the desert scene and the bold cliff by Claude.

Landscape Study, by Claude
(French b. 1600)



The Two Majesties, by J. L. Gerome
(French b. 1600)

Painters of Common Life

The Artist's Descriptions of Scenes and Character

Louvre
The Gleaners, by Jean Francois Millet
(French b. 1814)

PAINTINGS which deal with common life, or are notable for their emphasis on detail, belong to the "genre" type. Genre corresponds to realism in literature. We here reproduce what by many is regarded as Millet's masterpiece and four other examples of genre. The original of "The Torn Hat," by Sully, is in the Boston Museum. Contrast this typical boy, by an American artist, with the "Dutch Girl," by Rembrandt, and both with the timid little French girls in the picture below.

Thistle Print © Detroit Pub. Co.
e Torn Hat, by Thomas Sully
(American b. 1873)

The Sense of Touch, by Teniers
(Dutch b. 1610)

Chicago Art Institute
Portrait of a Girl, by Rembrandt
(Dutch b. 1606)

From His Series on French School Life.
Primary School for Girls in Brittany, by Jean Geoffroy (French b. 1853)

Painters of Common Life

From a Steel Engraving
Kept In, by Erskine Nicol
(Scotch b. 1825)

Pictures That Tell Stories

With what delight and with what profit children in school make stories about such pictures as those on this page every teacher knows and every parent *should* know. In "Kept In," for example, the good-hearted old school master isn't half so fierce as he is *trying* to be—with his pursed-up lips. The boy knows it. The battle is already more than half won and he has a piece of string ready for his confiscated top on the desk, when he gets it back. Notice that he has his hat and his books in his hand all ready to go.

"Breaking of Home Ties" is widely used in school work because of its emphasis on the sweetness of home life. No other picture attracted so much attention at the Chicago World's Fair where it was first exhibited.

The Pet Bird, by Meyer Von Bremen
(German b. 1813)

By Permission of Taber-Prang Art Co., Springfield, Mass.
The Doctor, by Luke Fildes (English b. 1844)

© *C. Klackner, New York*
Breaking Home Ties, by Thomas Hovenden
(American b. 1840)

© *Photogravure Turner Art Co.*
Girl With Cat, by Paul Hoecker
(German b. 1854)

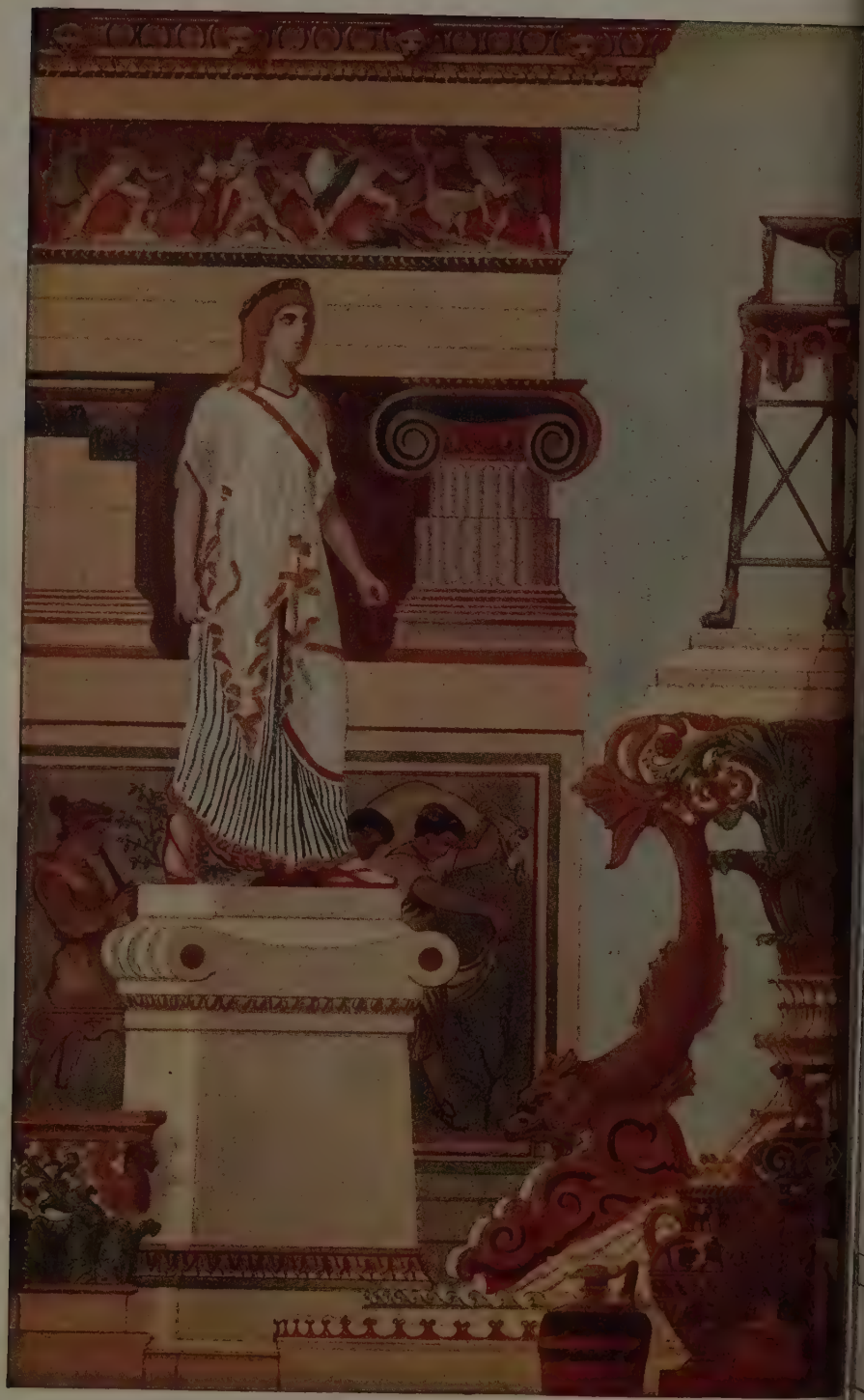
DRESS OF ANCIENT PERIOD (SEE DESCRIPTION FOLLOWING)

20 21 22 23 24 25 26

27 28 29 30 31 32

33 34 35 36 37 38 39 40

DRESS OF MIDDLE AND LATER PERIOD UP TO 1880 (SEE DESCRIPTION FOLLOWING)



GREEK ART

HOW AN AUTOMOBILE WORKS

The articles and pictures on this page and next will give you a clear idea of exactly how an tomobile works. Since the engine is described and explained in the article on Gas Engine (q.v.) shall devote these two pages to explaining the clutch, transmission gears, and differential—atures which to most people are even more mysterious than the engine. The pictures were ecially prepared with the idea of making everything absolutely clear. If you will look at them you read, and take pains to see how everything said in the text works out in the picture, you ll have a better idea of how a car works than many a man who has driven for years.

OTE.—The purposes of the various devices scribed are given in the article on Auto-bile. Here we describe *how they work.*

THE CLUTCH

We cannot shift gears while power is passing rough them to the wheels. Therefore an tomobile needs a "cut-off" device, so the iver may stop the flow of power without utting off engine, when he wants to shift ars. He does this by means of the *clutch.*

The clutch described here is of the multiple sk type. Power runs through it from left to ght, as shown. The parts are opened out far ore than in an actual clutch, in order to show w they work.

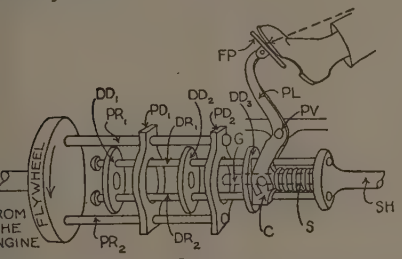


FIGURE 1

Look first at Fig. 1. Running out from the ywheel are two rods, PR_1 and PR_2, shown uch longer than in an actual clutch. When-er the engine is running, these rods go around th the flywheel, carrying the two *driving sks*, PD_1 and PD_2. These disks slide freely ong the rods, but rotate with them. These ds and disks make up the "driving" part of e clutch.

At the right of Fig. 1 is a shaft-head SH, om the gear-box. On the shaft-head are two ds, DR_1 and DR_2, extending leftward through les in the driving disks, and bearing three

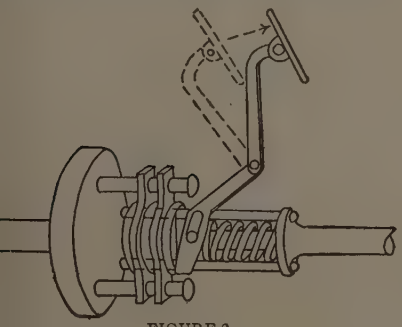


FIGURE 2

sliding disks, called the *driven* disks. These rods and disks form the *driven system* of the clutch.

Now look to the right of Fig. 1. Extending from the shaft-head is a guide-rod, G, shown by dotted lines. Mounted on it is a sliding collar C, kept pressed to the left by the spring S, as shown in Fig. 2. (Remember that all parts in Figs. 1 and 2 have been separated unduly, for clearness.) Attached to the collar is the lower part of the lever-pedal, PL, the lever being pivoted at PV.

When the driver wants to cut off the power, he presses the foot-pedal (FP) forward, as shown in Fig. 1. This moves the collar back against the spring, and allows the disks to fly apart. Since now there is no contact between

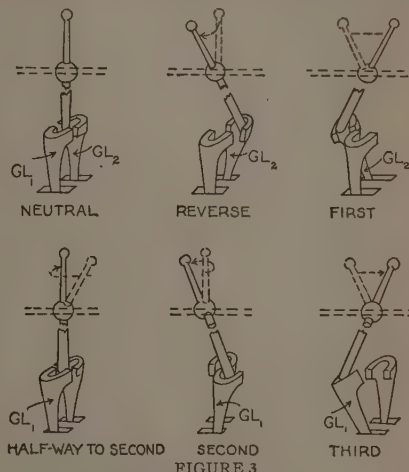


FIGURE 3

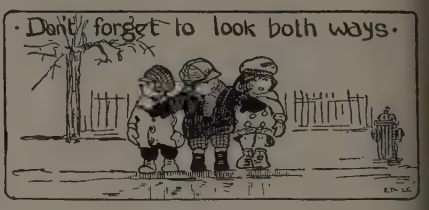
the disks, the driving system spins idly around the driven system without transmitting power. When the driver wants to go, he releases the pedal, the spring jams the disks together, the driving disks set the driven disks rotating, and the shaft-head sends power through the gears to the wheels.

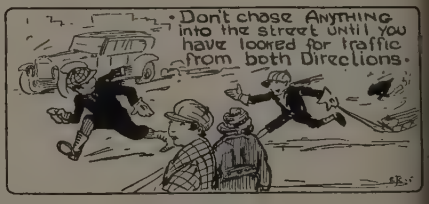
THE GEARS

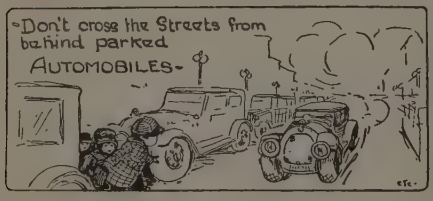
The driver shifts gears by means of a hand-lever. The various movements of this lever are transformed, as shown in Fig. 3, into backward and forward movements of two gear-box levers. With this in mind we are ready to examine the gears themselves, see how they are shifted, and what they do.

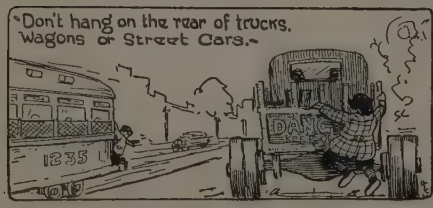
The gears as shown in Fig. 4 are in *neutral.* Power from the clutch enters as shown, and drives the gear-wheel A. This wheel is meshed with wheel B on the rod CS, called the *counter-*

TRAFFIC DON'TS FOR CHILDREN









Tying a string around one's finger is called what? 1201.
What is interest based on? 931.
Why has interest been looked upon with suspicion? 931.
What did Rousseau declare? 931.
Why was Rousseau's educational scheme one-sided? 931.
Why do we become interested in things? 931.
What is soft pedagogy? 932.
What does character mean? 932.
What was Rousseau's idea of child education? 384.
What does Herbart require of the teacher? 384.
What was the most interesting conception of Froebel? 384.
Who wrote "The Soul of the Child"? 385.
What is a valuable clew to the interests of children? 384.
How can a teacher get a pupil to learn? 385.
What is the dynamic force of learning? 652.
What is the secret of men's capacity to learn? 385.
Why is the term feeling ambiguous? 652.
What is the relation between feeling and cognition? 652.
How do disagreeable feelings help us? 653.
Can we have emotion without organic sensations? 653.
How is emotion a valuable aid to education? 653.
Why has the study of Latin been advocated? 1204.
How did religious conceptions develop character? 1204.
What is the faculty theory? 1204.
How should all studies justify themselves? 1204.
Will memorizing Shakespeare help to learn the rules of grammar? 1204.
What is the most important use of correlation? 1205.
How is the term imagination ordinarily used? 916.
How does imagination differ from memory? 916.
What is the value of imagination? 916.
Does imagination help the farmer, the mechanic, the milliner? 917.
What will make the pupil critical but not productive? 917.
How is habit distinguished from instinct? 821.
What is habit indispensable to? 821.
How may old habits be broken? 821.
At what age are our habits formed? 821.

MODERN EDUCATION.

What are the five great epochs in educational history? 584.
What is necessary for a liberal professional preparation for teaching? 584.
What is an extremely valuable work in education? 584.
What has been done to disciplinary subjects? 584.
What system of education was created in the 19th century? 585.
Is education in the U. S controlled by the states or by the Federal government? 585.
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What is the most important relation of the school garden? 1691.
Why are normal schools taking up school gardens? 1691.
What great universities have taken up school agriculture? 1691.
What does school organization and management embrace? 1691.
What is school sanitation? 1691.
How many cubic feet of pure air does each pupil need? 1692.
What are school ships? 1692.
What are the three periods of school song work? 1693.
Why should a careful selection of school songs be made? 1692.
What does the song, "Bring the Comb," picture? 1693.
What are the teaching points gained by school songs? 1693.
What are the difficulties of music in high schools? 1695.
What is the function of public school music? 1695.
What are the three essential means for comprehending music? 1286.
How does the second phase of music study differ from the first? 1287.
How should the motif be used? 1288.
How has modern invention helped the study of music? 1288.
What does musical notation deal with? 1288.

BOTANY

THE SCOPE OF THE SUBJECT: Botany 249.

DIVISIONS OF THE STUDY:

Taxonomy — the classification of plants 1875.
Morphology—the forms of plants 1264.
Physiology — the activities of plants 1487.
Ecology — the environment of plants 580.

I. TAXONOMY:

THE FOUR DIVISIONS OF THE PLANT KINGDOM:

1. **Thallophytes:** meaning thallus-plant; having a characte tic plant-body 1897.
2. **Bryophytes:** having distinct alteration of generations and m complex body 281.
3. **Pteridophytes:** having a leafy and vascular sporophyte; producing no seeds 1558.
4. **Spermatophytes:** meaning seed-plants, called flowering pl 1797.

(Note: The first three of the above divisions are called Cryptogam plants that do not produce seeds — 484. There is also a gr between plants and animals called Myxomycetes: 1297.)

1. THE THALLOPHYTES: the lowest group of plants 1897.

a. **The Algæ:** most primitive forms of the plant kingdom 48; and making their own food with chlorophyll 393.
- (1) **The Cyanophyceæ:** the blue-green a or green slimes 491; coenocyte Heterocyst 871.
- (2) **The Chlorophyceæ:** the green algæ 392.
  - (a) **Protococcus fo** 1554.
  - (b) **Conferva form** 392.
  - (c) **Siphon forms:** spirogyra 180
  - (d) **Conjugate fo** or brown 1463.
- (3) **The Phæophyceæ or brown algæ:** the Sargassum, making the Sarg seas 1681.
- (4) **The Rhodophyceæ or red algæ;** prized venirs of the seashore 1609; Liche intermediate forms 1065; symb 1859.

b. **The Fungi:** taking their food from other plants 724; parasites saprophytes 1678; mycelium 1293; mycorrhiza 1294.

(1) Four groups of fungi:
- (a) **Phycomycetes:** 1479; as b moulds, downy mildews cœnocyte 419.
- (b) **Ascomycetes:** 17; blue-mo truffles, 1946; and peri yeasts 2121; mildews 12
- (c) **Æcidiomycetes:** 17; as rusts and smuts 1772.
- (d) **Basidiomycetes:** as mushr 1284; toadstools 178.

2. THE BRYOPHYTES: the second group of plants 281.

a. **The Hepaticæ:** the liverworts 865; rhizoids 1606.
- (1) **Marchantiales:** 1168; green above and with rhizoids on u surface 1606.
- (2) **Jungermanniales:** like delicate moss 865.

ARITHMETIC

NUMERATION TABLE

ADDITION

SUBTRACTION (Austrian Method)

MULTIPLICATION

DIVISION:

Short Division

Long Division

DECIMAL FRACTIONS:

Addition and Subtraction of Decimals

Multiplication of Decimals

Division of Decimals

UNITED STATES MONEY:

Bills and Accounts

Cash Accounts

Business Exercises

Factors and Multiples

Cancellation

Least Common Multiple

FRACTIONS:

Addition of Fractions

Subtraction of Fractions

Multiplication of Fractions

Division of Fractions

TABLES OF MEASURES:

Length of distance—Surface·
Volume; Counting; Capacity

PRACTICAL APPLICATION OF SURFACE MEASURE:

Board Measure
Carpeting
Papering
Plastering
Laths and Shingles

TIME SHEETS·

Carpenter's Time Sheet
Contractor's Time Sheet
Manufacturer's Time Sheet

PERCENTAGE:

Profit and Loss

INSURANCE

TRADE DISCOUNT

COMMISSION

TAXES

CUSTOMS AND DUTIES

INTEREST

RATIO AND PROPORTION

POWERS AND ROOTS

RIGHT TRIANGLE

AREA OF SURFACES

RULES FOR FINDING CURVED SURFACES

RULES FOR FINDING THE VOLUME OF SOLIDS

ARITHMETIC.

THE FOREWORD.

The aim of this treatise on Arithmetic is

1. To develop the parts of the subject most likely to be of practical alue to the pupil in after-life.

2. To eliminate subjects which perplex the pupil without affording ay valuable mental discipline.

This work will be found especially valuable in the home, as it furnishes istruction and carefully graded exercises.

1. For pupils who fall behind their class on account of absence.
2. For pupils who are slow to comprehend the teacher's explanation.
3. For pupils who fail of promotion and who wish to study during ie summer vacation.

The steps to be acquired by the pupil in the study of Arithmetic re

1. A knowledge of number.
2. The expression of number.
3. Power and skill in operations.
4. Logical and accurate thinking.

The teacher should realize that

1. Arithmetic deals with numbers not figures.
2. Primary ideas of numbers and of operations should be gained from ojects.
3. Pupils must be thoroughly drilled on the fundamental operations f Arithmetic.
4. Pupils must be impressed with the importance of absolute correctess.

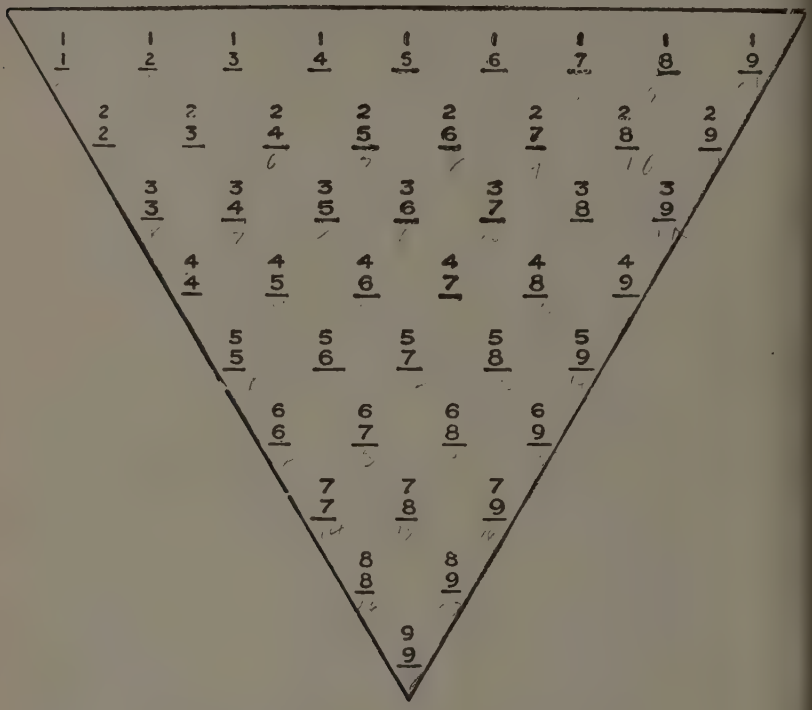
The pupil must be taught to interpret the language of the problem,

1. To know exactly what is given.
2. To know the relation of what is given, and from this knowledge o select the proper arithmetical process.
3. To perform the arithmetical process.
4. To forecast, when possible, the approximate answer.

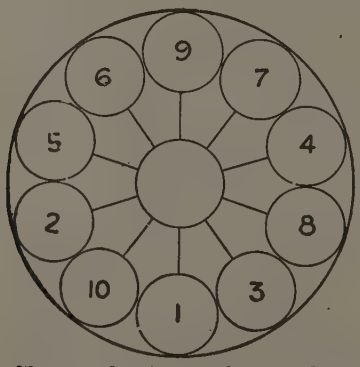
Pupils should be urged to devise problems to be solved.

If a child does the work mapped out, drilling on the fundamentals, eading the problems carefully and thoughtfully, picturing the objects as ney are described, he will, as a result, be ready to solve problems by ostract thinking.

The following chart gives every possible combination of the digits:



For rapid work in addition. Let the teacher write any number in the center circle. Pupils should promptly give the sum of the center figure and one of the outer figures to which the teacher may point.

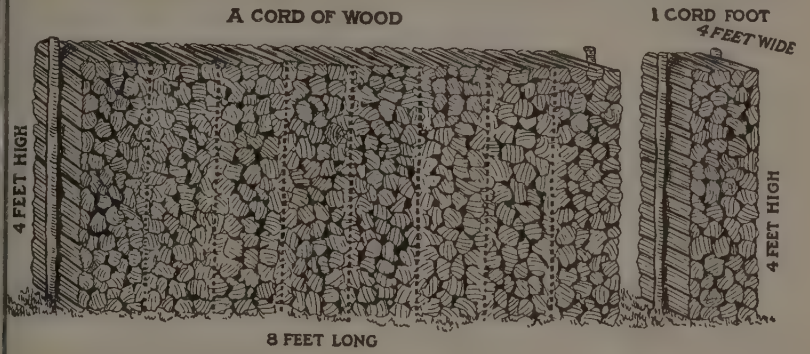


Change the center figure often.

VOLUME.

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
27 cubic feet = 1 cubic yard (cu. yd.)
128 cubic feet = 1 cord (cd.)
16 cubic feet = 1 cord foot (cd. ft.)
8 cord feet = 1 cord (cd.)

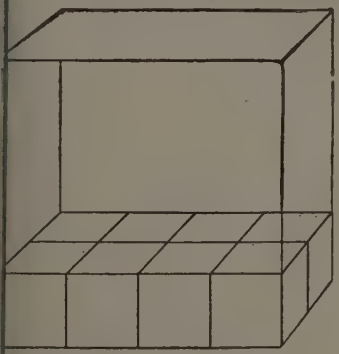
A cord of wood is a pile of wood 8 ft. long, 4 ft. wide, and 4 ft. high.



A *rectangular solid* is a solid bounded by six rectangles. The rectangles are called the *faces* of the solid.

A *cube* is a rectangular solid bounded by six equal faces (squares).

The *volume* of a solid is its contents reckoned in cubic units.



How many cubic feet are there in a rectangular solid 4 ft. long, 2 ft. wide and 4 ft. high?

Multiply the number of cu. ft. in 1 row by the number of rows, to find the number of cubic feet in 1 layer.

Multiply the number of cu. ft. in 1 layer by the number of layers. This gives the number of cu. ft. in the solid.

4 cu. ft. in 1 row.
2
—
8 cu. ft. in the 2 rows (the bottom layer).

8 cu. ft.
4 (number of layers).
—
32 cu. ft. in the solid.

Rule for volume.

To find the volume of a rectangular solid, multiply the area of the base by the height.

Duties are reckoned:

1. At a certain per cent on the value of the goods, called *ad valorem duties.*
2. At a certain amount per pound, yard, etc., called *specific duties.*

Certain goods are subject to both ad valorem and specific duties. Government determines by an Act of Congress the duties to be paid.

INTEREST.

Charles Adams borrowed $2500 for a year, and used it in his business. At the end of the year he paid back the money, and also paid 6 per cent of the money borrowed. How much did he pay for its use?

Henry James secured a loan from the bank of $12,000 with which to buy a tract of land. The bank agreed to loan the $12,000, on condition that Mr. James would pay the bank each year a sum of money equal to 5% of the loan. How much did Mr. James pay each year?

Money paid for the use of money is called *interest.*

The sum for which interest is paid is called the *principal.*

The sum of the principal and the interest is the *amount.*

Interest is reckoned at a certain per cent of the sum borrowed.

Interest at 6% means 6c on each dollar for 1 year.

The per cent of interest is called the *rate of interest.*

The rate of interest varies, generally from 2% to 6%.

Savings banks pay 3% or 4%. Good securities demand a low rate of interest.

George H. Brown borrows $600 of John A. Briggs and agrees to pay interest at 5%. Mr. Brown should give Mr. Briggs a written promise to pay the money.

This written promise is called a *promissory note.*

A Promissory Note.

$600. Boston, Feb. 1, 1911.

On demand I promise to pay to the order of

John A. Briggs

Six hundred Dollars

with interest at 5%.

Value received.

George H. Brown.

DECIMAL FRACTIONS.

Decimal fractions, usually called decimals, express one or more of the ecimal divisions of a unit. Decimal fractions are generally expressed by riting the numerator only, the denominator being shown by the position f the decimal point, as illustrated by the following:

.4	four tenths.
.04	four hundredths.
.004	four thousandths.
.0004	four ten-thousandths.
.00004	four hundred-thousandths.
.000004	four millionths.

Read the decimal as if it were a whole number, then add the name of he place of the right-hand figure.

A whole number with a decimal is called a mixed decimal.

In reading a mixed decimal, use the word *and* between the whole umber and the decimal.

Much drill in reading and writing decimals is desirable.

Read the following:

.408	.0050	32.037	.000058
.0506	.00401	20.070	.000506
.0458	.02000	9.009	.002600

Express the following in decimal form:

$\frac{3}{10}$ $\frac{5}{10}$ $\frac{45}{100}$ $\frac{62}{100}$ $\frac{320}{1000}$ $\frac{475}{1000}$ $8\frac{4}{10}$ $32\frac{4}{100}$

7 tenths
8 hundredths
2 hundredths

425 thousandths
62 thousandths
6 thousandths

8 and 6 tenths
12 and 6 hundredths
15 and 6 thousandths

ADDITION AND SUBTRACTION OF DECIMALS.

Use same method as in whole numbers.

Arrange units of the same order in the same column.

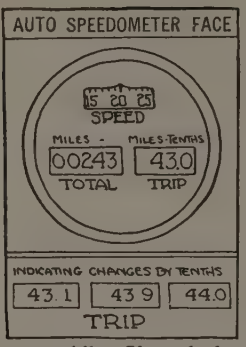
Keep the decimal points one under another.

Place the decimal point in the answer directly under the decimal oints in the example.

EXERCISE 10.

Addition:

1. 2.457+3.576+8.01+.4592+82.4070
2. 9.423+732.01+62.+8.4067+4.04863
3. 24.84+8.531+.4004+6.07
4. 14.4278+3.042+2.0046+.8795+3.6745+.297
5. 2.243+5.1462+3.0481+.72546+.04652



eter of an automobile. If you look at the face of the speedometer it will show some number, say 43.0. Notice the naught and the period before it. Now 43.0 means 43 miles. After you have gone a little way on the road the speedometer will read 43.1, which means you have gone 43 miles plus $\frac{1}{10}$ of a mile. So .1 means $\frac{1}{10}$, and .2 means $\frac{2}{10}$, and so on. When you have gone $\frac{9}{10}$ of a mile the speedometer will read 43.9. Now watch it when you go another $\frac{1}{10}$ of a mile. That would mean you have gone $\frac{10}{10}$ of a mile, and you know that $\frac{10}{10}$ of a mile means 1 mile. So the speedometer will go from 43.9 to 44.0; and then start over again on the tenths.

We may also learn decimals by making change. There are 100 cents in a dollar; so we shall have to think of divisions of a hundred, instead of ten as in the road problem. Here is what we do when we divide into 100 parts. Say we have nine cents. We write it as $0.09 (no dollars and nine cents). Now say we put two more cents to our nine cents. We write eleven cents this way $0.11. Now let us say that we have 95 cents to put with our 11 cents. That gives us a total of 106 cents. But 100 cents make a dollar; so let's take out a hundred of the cents and change them for a dollar. We do this by putting the dollars to the left of the decimal point. Instead of saying 106 cents, we say $1.06. You remember the speedometer went from 43.9 miles (which can be written 43.90 miles) to 44.00 miles. Well, our dollars work the same way. If we had $43.90, and added 10 cents, we would have $44.00. Now you make change with your father, and he will tell you whether you do it correctly.

Figuring Interest

When you put some money in a bank, you should know how much interest you are going to get. Here is the way to figure it. Say that you put $6.82 cents in the bank. The bank, say, pays four per cent. interest; that is, it pays you four cents a year for each dollar you give the bank to use, and when you take your money out you get all you put in plus the interest the bank gives for the use of the money.

Now, four cents, or four per cent., is written .04. Then multiply the amount you put in the bank, $6.82 by .04. This way:

$6.82 You place the period before the 2 in
.04 .2728 because you must have as many
.2728 numbers to the right of the decimal point in the answer as there are numbers to the right of the decimal points in the figures 6.82 and .04, or four numbers. Now .2728 means twenty-seven cents and $\frac{28}{100}$ of a cent. $\frac{28}{100}$ is less than one-half a cent; so you will not count it.

There is one rule in simple interest that is easily learned, and helps a lot. It is called the "six per cent., sixty-day rule." Interest on any amount at 6% for 60 days is found by moving the decimal point two places to the left of the amount on interest. For instance if you have $23.45 on interest at 6% for 60 days, the interest for the 60 days would be .2345, or twenty-three and forty-five hundredths cents. Interest on the same amount of money for a year can be found by multiplying the interest for sixty days by 6.

Common Austrian Division Method

Our older readers may be interested in learning the Austrian method of division, as they were the Austrian method of subtraction given above. Here is the old method; with sample problem:

```
2.5)6.275(2.51   "Point off as many places in
  50              the quotient as the number
 127              of decimal places in the
 125              dividend exceeds that in the
  25              divisor."
  25
```

Here is the Austrian method:

```
  2.51   Dividend and divisor having been
25)62.75 multiplied by such a power of 10
  50     as makes the divisor a whole num-
 127     ber, the decimal point in the quo-
 125     tient simply goes above that in the
  25     dividend.
  25
```

Mathematics Curriculum

While the school systems of different states vary, in general the milestones in arithmetical progress mark, approximately, the division given below.

First half year: Count to one hundred, read and write to one hundred, memorize about twenty of the forty-five combinations in addition the sum of which does not exceed nine, give much of the work in oral form. During the second half year addition and subtraction in their simplest forms are given, and a few measures learned. Second year: Drill in the work taught the first year, numbers are enlarged, and about forty-five combinations in multiplication memorized. Third year: Review of the previous two years' work, with added feature of rapidity; introduction of geometric forms, also the idea of area, "carrying" in addition, and multiplication and division. Fourth year: Common fractions

THE REFERENCE HABIT

By Dr. Frank Crane

ONE of the most valuable things for a boy to learn is that the wisest man is not the one who knows the most facts, but the one who knows where to find out the facts.

Knowledge is power, but we do not have to carry the whole power plant in our heads. It is enough to know where the power can be had, and to have the wires up so that we can draw upon it at any time.

Education is not merely learning a lot of things. It is really learning how to think. It is learning where facts are to be had, and how to get at them, and how to use them.

Every boy and girl, therefore, should early get the reference habit—that is, the habit of going to the great books where knowledge is stored, and finding out the fact wanted.

First of all reference books is the dictionary.

Every young man should own an unabridged dictionary, a big one, and not merely a little handy volume. The dictionary should be the first book in every library.

Next in importance to the dictionary comes a good encyclopedia and atlas, or collection of maps.

If every time you hear a word that you do not understand, or hear some subject spoken of that is not familiar to you, you will jot it down in your notebook and look it up in one of your reference volumes, you will be on your way toward the best kind of an education.

We must bear in mind that it is not just reading which gives us a full mind and makes us intelligent and well posted. It is not just wading through book after book. The reading which does you real good is reading with a purpose. It is "looking up" some subject.

We should go to books as we go to a drug store to get some particular thing that we want. To get the good out of the drug store we do not have to begin at one end of the shelf and take every drug there is. We have to select the one that we need.

One habit that every young person should cultivate early is the library habit.

Those who are young nowadays have much greater advantages than those who were young fifty years ago. Then libraries were few and far between. Now there is a good one in almost every town.

Get the habit of spending an afternoon or a morning once a week, if possible, in the library looking up subjects about which you are curious or in which you are interested.

Besides this, if you have time, it is a good habit to browse aimlessly among books, reading here and there, and getting familiar with the great field of literature.

Books contain the treasures of knowledge, the stored-up wisdom of the wise men who have gone before us. And the more we are familiar with them the fewer mistakes we shall make.

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INDEX OF FULL PAGE ILLUSTRATIONS

Since pictures convey a more definite idea of the appearance of persons and things than words alone can possibly do, the abundant use of illustrations is one of the most important features of *The Student's*. The text pictures relating to any given subject will always be found, of course, by referring to the proper heading in the index of subject matter, but the full page illustrations contain a large number of pictures illustrating other subjects than those to which they immediately relate, and this index is to extend their usefulness. For example, the two plates showing "Common Birds in Their Natural Colors," contain the pictures of thirty-one different birds, and each bird is here indexed alphabetically.

The pictures relating to any one subject, in addition to being indexed alphabetically, are also grouped under the subject headings. For example, all the full page illustrations pertaining to Physiology, in addition to being indexed under "Heart," "Brain," etc., are all brought together under "Physiology."

Geographical topics are not only classified under "Geography" and under the different continents and countries, but the headings "Agriculture," "Botany," "Geology," "Meteorology," and "Zoology," should be consulted.

The illustrations referred to, either face the page number given or are in the series of pictures following the page number. The pages marked "H" are in the *How and Why Library*.

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THE

HOW AND WHY LIBRARY

LITTLE QUESTIONS THAT LEAD TO GREAT DISCOVERIES

BY

MRS. ELEANOR ATKINSON

Author of Greyfriar's Bobby: The Boyhood of Lincoln, Etc.

SCHOOL STUDIES MADE AS FASCINATING AS FICTION FOR CHILDREN AND READERS OF ALL AGES

ludes an Explanation of the Beginning and Brotherhood of Life as Every Mother Wishes her Child to Know It; A Trip Around the World; Picture Visits to the Great Industries and Intimate Insights into the Ways of Men, Birds, Flowers, Insects, Wind and Weather

FILLED WITH BEAUTIFUL AND INSTRUCTIVE ILLUSTRATIONS—MANY IN COLORS

he objects of the Congress shall be to bring into closer relations the home and the school; . . . to surround ildren of the world with that wise, loving care in the impressionable years of life that will develop good s.—*From the Constitution of the National Congress of Mothers.*

o bring parent and school into closer relations is so important that we cannot overestimate it.—*Charles rry, Professor of Education, Northern Illinois Normal University and Contributing Editor to The New t's Reference Work.*

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YOU EXPECT GREAT THINGS OF HIM

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HOW AND WHY OF ETIQUETTE

Dr. Eliot says the subject matter of this section is one of the most important parts of education. "Manners" and knowledge of certain social forms are no less valuable in "getting on" in one's life work. Lack of such information and training frequently explains why some succeed while others of equal or greater natural ability, fail. Self control, grace of bearing, ease of expression, the habit of drawing out the best in others—these things the world rightly regards as the real tests of education. Yet proper and sensible guidance is difficult to find.

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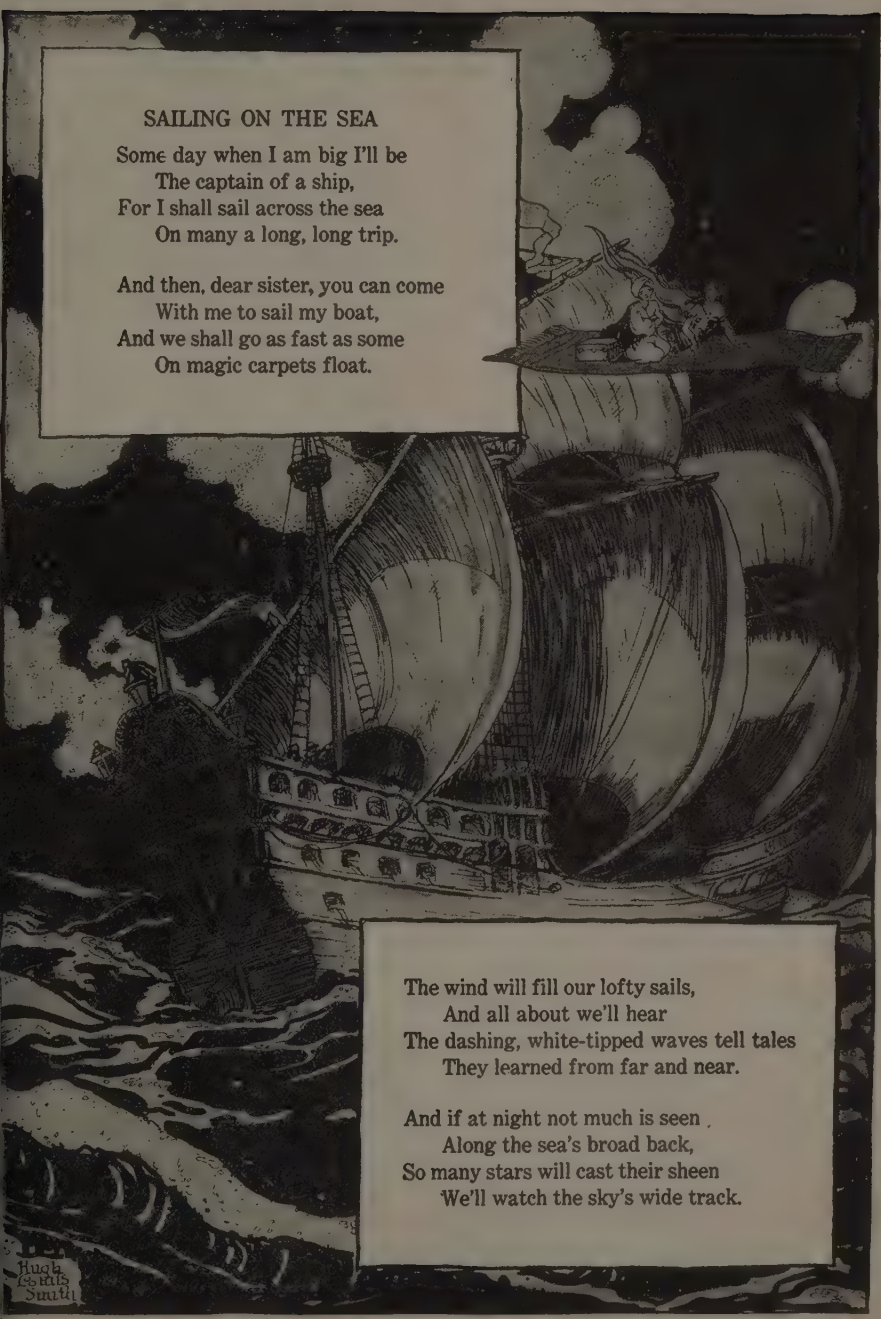


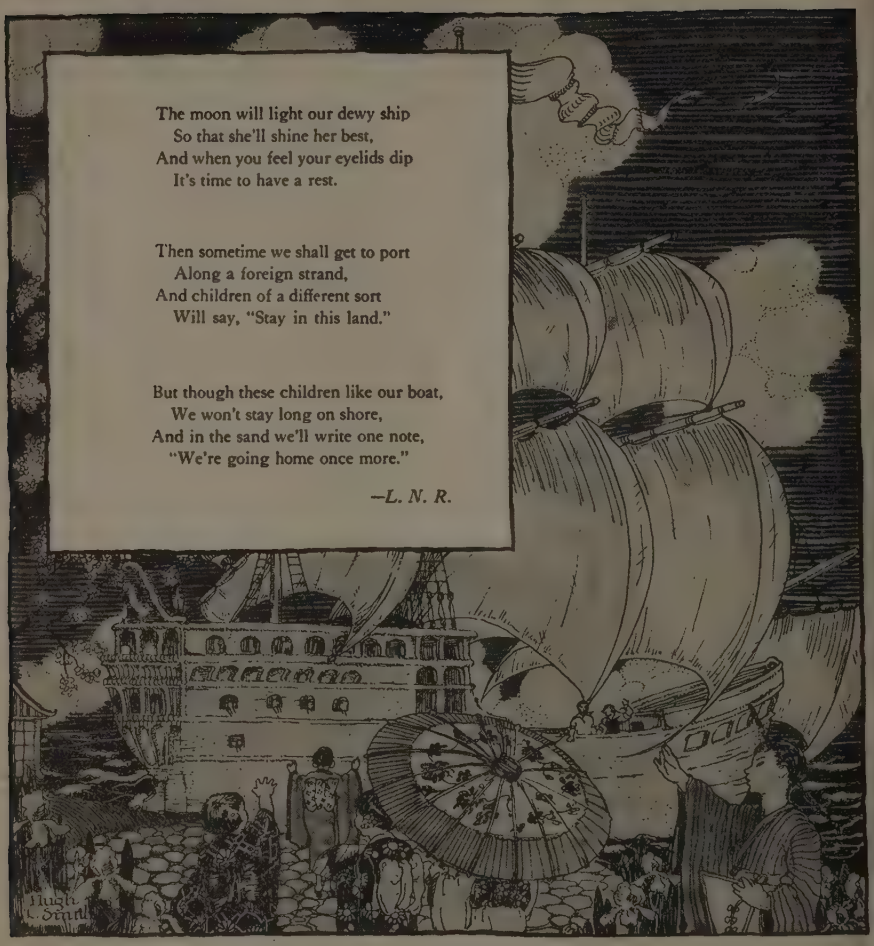
SAILING ON THE SEA

Some day when I am big I'll be
The captain of a ship,
For I shall sail across the sea
On many a long, long trip.

And then, dear sister, you can come
With me to sail my boat,
And we shall go as fast as some
On magic carpets float.

The wind will fill our lofty sails,
And all about we'll hear
The dashing, white-tipped waves tell tales
They learned from far and near.

And if at night not much is seen
Along the sea's broad back,
So many stars will cast their sheen
We'll watch the sky's wide track.

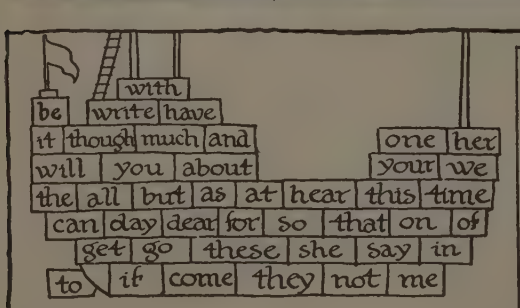


The moon will light our dewy ship
So that she'll shine her best,
And when you feel your eyelids dip
It's time to have a rest.

Then sometime we shall get to port
Along a foreign strand,
And children of a different sort
Will say, "Stay in this land."

But though these children like our boat,
We won't stay long on shore,
And in the sand we'll write one note,
"We're going home once more."

—L. N. R.



Note to Parents: It has been said that if the total number of words used in ordinary conversation were counted, one-fifth of the number would be composed of repetitions of nine words: *and, be, have, it, of, the, to, will, you.* It has also been said that these nine, together with thirty-four other words, are repeated so often that they are used half the time while speaking. The other thirty-four are: *about, all, as, at, but, can, come, day, dear, for, get, go, hear, if, in, me, much, not, on, say, she, so, that, these, they, this, though, time, we, with, write, your her, one.* Of course the speaking vocabulary of individuals varies greatly; but at the least, the words listed above are among the most basic in the language. The accompanying poem, *Sailing on the Sea,* contains all the words mentioned, and is an excellent one for you to use while teaching your children to read.

THE "WHY" OF THE HOW AND WHY LIBRARY

IT IS well known how eager all normal children are to go to school.

By "school" we mean not so much the Common School, as the Commoner School we call "Life."

A child instinctively asks questions. Curiosity is the appetite of the mind. His questions show that his mind is all ready for the answers. If they are given wholesome encouragement and direction, he will grow to find the greatest pleasure as well as profit in learning about the great and good things of the world he has inherited rather than the silly and the bad.

The answers can be made and are here made to lead straight into invention, art, science, engineering, good morals and good citizenship, preparation for a successful life—the development of a clean, strong body and a clean, strong mind.

To bring home and school into such practical co-operation in the development of the child—that is the greatest idea in the modern educational system; that is the purpose of the "How and Why Library." Its articles have a field all their own. They do not take the place of the delightful story books for children—of which there are many that are good in spite of the fact that there are so many that are either worthless or bad. Neither do they take the place of the text book. They prepare for the text book before the child starts to school; they supplement it after he begins.

Did you ever stop to think what a big thing a little key is? The "Hows" and "Whys" between these book covers are the keys to this wonderful world of ours. Without such keys the child cannot enter—cannot understand. This is the tragedy of the old school methods.

Modern education is entering a field of glorious possibilities for our children, but we must do our share. The school can help the home, but the home must help itself. The mother-teacher, the father-teacher, the big-sister and big-brother teachers must come back again.

After all, they're our children—our little brothers and sisters—aren't they?

Open the door and walk in—children and all. Because it is such a remarkable work for children, it is none the less a work of infinite charm for readers of all ages.

THE PUBLISHERS.

Helpful Suggestions on the Pleasant Art of Instructive Story Telling

Considerations of the Mechanics of Story Telling, with Illustration

Story telling is an ancient art handed down to us from the time when it was practically the only "school," the sole method of distributing knowledge. This ancient pleasure is being revived. It is the most pleasant way of instructing the young that we know. More and more our schools are adopting this method, and by it our young people are learning quickly and most willingly. A story, properly told, will give information and knowledge; it will also develop the imagination, assist in moral guidance, increase the vocabulary, and teach concentration.

Let us consider the subject matter. It is more inclusive than we believe, including not only fairy tales, but natural history, science, government; in fact, every subject known. The only rule to be observed is that, in the choice, the subject should be limited to one thing: Mr. Wasp, Franklin Flies a Kite, etc. Broad subject matter scatters the thought and fails to entertain.

As a second consideration, do not neglect the entertaining element, for only to the degree that a story holds interest will it likewise instruct; it must teach and entertain at the same time.

Action must be the keynote, even in the introduction; and immediate point of contact with the audience or child must be secured. For instance, if telling about the wasp, one may start with the insect in motion, and gain point of contact by showing the similarity between the buz-z of the wasp and the child's hoot, ho-ot as he rushes down the street on his velocipede. This point of contact is very important. A child often wishes to be the object itself: the engine and engineer combined; invariably he is interested in a subject only insofar as he may fit himself into it by imagination, by "pretending."

Actively continuing the story, a moral may be quietly included. For instance: "With all his buzzing, a wasp seldom bothers any one who doesn't bother it. We have city laws to protect our rights; the wasp carries his laws in his stinger. People know more than animals; we do not carry our laws in our fists, but have stopped fighting, and have good laws instead." This also contains a point of contact. So will the same personal touch be secured as we tell about the wasp's paper-making industry and home-building efforts.

As we proceed with our story, we must not forget our vocabulary. The child will then quickly learn correct usage of words by imitation—and a child is very imitative. One must not be stilted in manner and selection. The use of imitative sounds is graphic and laudable, but never indulge in "baby talk."

Humor is a saving grace, not only at the council tables of the great—as Lincoln so well illustrated—but in the schoolroom, the home, and the story. Oftentimes it may point a moral: "Baby wasps spend their lives in cocoons or blankets, and are fed by their older sisters. When an older sister feeds a baby, she flies up to it, waving her wings, and the baby opens its mouth to receive the food, at the same time giving its older sister a drop of sweet nectar from the end of its tongue. Then the older sister learns that if she merely flaps her wings the baby will offer the drop of nectar, and so she does this, without giving the baby any food in return. But the baby soon discovers this trick, and refuses to give nectar. Then the older sister grabs the baby, and chucks its head back in the blanket. The baby can not help giving nectar then; since every time its head is chucked back, it must open its mouth, and the sweet fluid rushes to the tip of its tongue. This process exercises the baby, and develops its muscles, just as work and play cause children's bodies to grow. But after a while the baby has no more sweet fluid, and the sister must feed it again. We can not expect others to lend us their playthings if we do not permit our brothers and sisters to use ours."

Several other principles must be kept in mind. The story teller must know the story thoroughly. She must take a great deal of interest in the story; one must never expect a child to take interest in anything that is presented to it in haphazard fashion. She must be natural and unaffected, or the child will think of her and not of the story. She must draw graphic pictures, and her facial expressions, motions, and word inflections must be lively and in sympathy with the incidents of the story. Finally, if she is before a group of young people she must watch her audience, and be possessed of a will to succeed.

STORIES IN GEOGRAPHY

CHILDREN OF OUR OWN AND OTHER LANDS

EDITORS' NOTE TO MOTHER AND TEACHER.—The study of descriptive and political Geography is introduced into the very first year of school, through travel stories. The first interest that little children show in other people and lands, is in the way other children live, particularly those of primitive peoples like the Indians and Esquimos, and people whose ways of living are radically different from their own. Geography teaching now takes advantage of this curiosity, on the part of the children, to introduce them to the general study. In this way they get a knowledge of the physical appearance, manners and customs, climate, products and transportation of other peoples and countries, in addition to some history and physiography. The supplementary reading with the geographical aspect, supplied to the lower grades, is very wide and comprehensive. To cover all that is supplied, requires the purchase of a great number of little supplementary readers, each at a cost of from thirty to fifty cents.

This geographical department covers the most essential and attractive features of any one dozen supplementary readers, and has, besides, a unity of plan that none of the readers possess. The plan is to present primitive America, when it was inhabited only by the red child, then to bring the other children in, over the sea, in the chronological order of the colonization and settlement of the United States. The order followed here is the Indian, the English Puritan, the French, the Dutch and the Negro. The Esquimo peoples were visited very early by the New England whalers, and the Spanish colonists by trading vessels that went to Havana.

When once the sea-board was peopled, came the period of the hunter in Kentucky. There the experience of Daniel Boone is taken as typical. This paved the way for the pioneer of the Lincoln period. During this time there were large migrations of German and Irish peoples. The discovery of gold carries the settlement of the United States to the Pacific coast. The subsequent development of California, as it is today, follows.

Once having reached the Pacific coast, curiosity is led to take the world-round journey, to visit the children of the yellow and brown races, and the children of the Desert and the Alps. The world journey is logically completed by the return to the New York City of today, and a description of Castle Garden, where more than a million people of foreign lands are still entering America every year. This last feature is not to be found in any child's reader on the market.

The object, in these nineteen sketches, has been to present typical pictures of such facts as children are curious about, that will furnish a

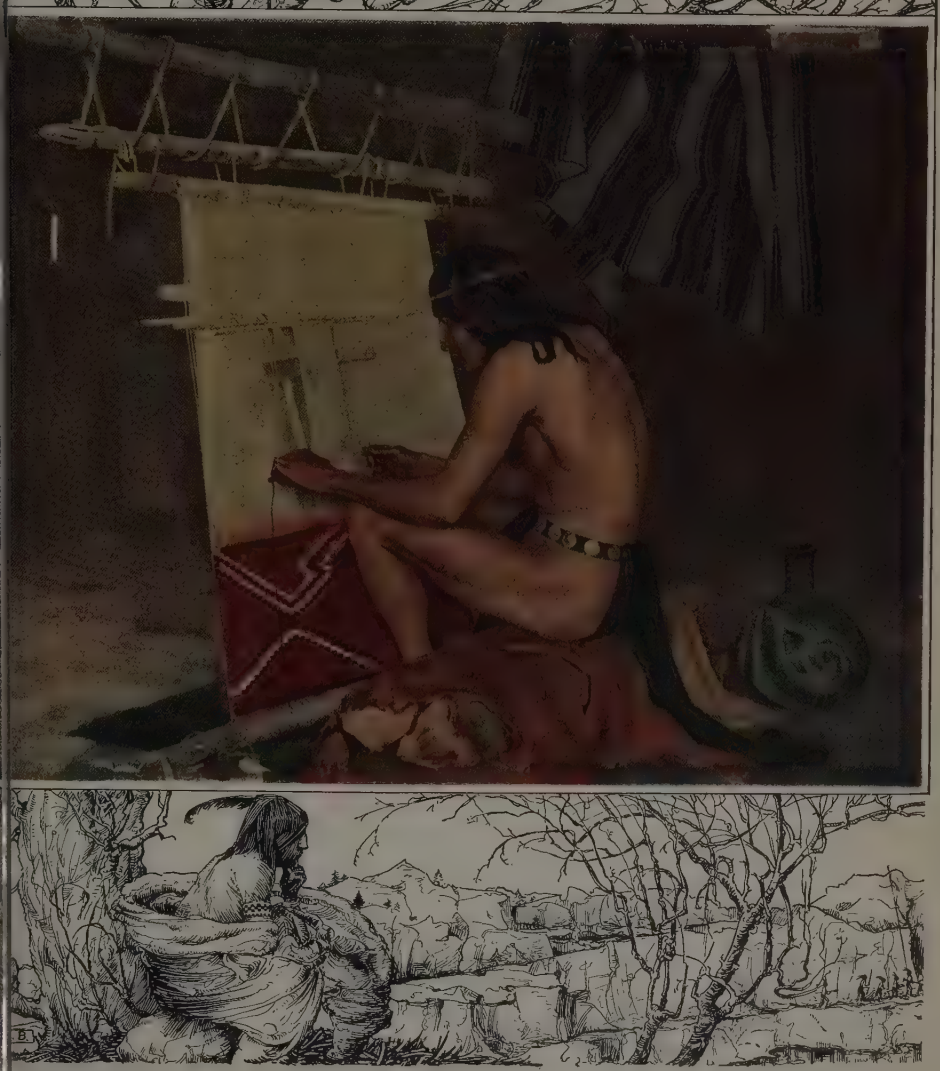
CHILDREN OF OUR OWN AND OTHER LANDS

I. THE RED CHILD OF THE FOREST

You are proud of being an American boy, aren't you? Perhaps you will be surprised to learn that there is another boy who has a better right to the name than you have. He was here four hundred years ago, when Columbus sailed over the wide ocean and found our country.

This American boy was tall and straight and slender. His eyes were as black as ink, his hair as black as a crow's wing. He could run like a deer, swim like a fish and climb like a squirrel. He was as solemn as a little owl. When he grew to a man he wore a head-dress of eagle feathers. His skin was not white like yours. It was very nearly the color of an English penny or an American one cent piece. Now you know what he was. He was an American Indian. There are still a good many Indians in our country. They live in houses, on big farms. They dress like white boys, speak English and go to school. But their faces are the same as those Columbus saw.

It was a hard, wild life the Indian boy lived. Still, he had a good deal of fun. It was like camping out all the time. There were four or five million Indians here, but the country was so big that there was room for everybody to move about a good deal. There were no cities or farms; no railway trains or wagons. The Indians had to travel on foot. They followed narrow paths, or trails, through the forests and over the plains. On the rivers and lakes they made long journeys, in boats so light that they could carry them on their shoulders from one stream to another. These boats they called canoes. They were made of birch bark stretched over frames of wood. A great many Indians travelled together, for company and for safety. Each band was called a tribe and each had a chief. When a tribe found a good place to camp, some poles were stuck in the ground in a circle. The top ends of these poles were tied together. Then the skins of wild animals, or mats woven of rushes were fastened over the poles. They called this tent a wigwam. Some Indians built dome-shaped



GE DE FOREST BRUSH

Courtesy of Milch Galleries

THE WEAVER

oday Eagle Heart weaves blankets to sell to the Palefaces. As no design is made, he plans as he weaves. No two blankets
ke. Some colors he likes better than others. The next time you see an Indian blanket, try to pick out the colors. You will
rk blue, yellow, red, black, and white, as they are the favorite ones with the Indians.
ot all Indians were fierce and always fighting the White Men. The Navajos who are famous for the blankets they weave,
eaceful, industrious nation, and, unlike other tribes, are increasing in number. They do not build lasting homes, but move
pasturage and water supply for their herds change.
his picture is considered one of the best paintings of Indian life.

CHILDREN OF OUR OWN AND OTHER LANDS

TRAVEL STORIES

The Red Child of the Forest
Indian—In the Wilderness with Eagle Heart

The Little Pale Faces Who Came Over the Sea
Children of the Puritans

Little Wooden Two Shoes
Dutch—A Trip to Holland and Back to New Amsterdam

Ship Loads of Politeness
French—A Voyage with Louis and Jeanne to America

Little Friends in Furs
In the Home of the Esquimos

Children from Spain
With Juan and Dolores in Cuba

The Little Black Children Who Lived in a "Zoo"
From Far Away Africa to the Cotton Fields of the South

Babes in the Woods
With Daniel Boone in Kentucky

Pioneer Days and Ways
From Log Cabin to Whitehouse

What "Liebe Mutter" Brought to America
St. Nicholas and the Christmas Tree

The Miraculous Pitcher
The Merry Jokes of the Irish

The Golden Fleece of America
Across the Continent in a Prairie Schooner

Alice in Wonderland
To California in a Palace Car with Grandpapa

The Children of Topsy Turvy Land
The Little Folks of Japan

All Work and No Play for Little Wung Foo
The Chinese Boy Who Goes to School Before Breakfast

All Play and No Work for Manuelo
Little Brown Children of the Philippines

Children of "The Arabian Nights"
The Deserts of Arabia

The Little Country of the Big Mountain
Seeing Switzerland and the Alps from a Flying Machine

The "Front Door" of America
Ellis Island

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"LITTLE WOODEN TWO SHOES" ABOUT TO EMBARK TO AMERICA

AREN'T THESE CHILDREN INTERESTING?

THERE are Nineteen Chapters in this Department. The following extracts give some idea of their charm. They must be read as a whole to be fully appreciated. Fifty-five pages and seventeen full page illustrations.

THE PURITAN MAIDEN AT HOME

From Chapter II. "Little Pale Face Who Came Over the Sea."

"Six year old Faithful was knitting a stocking. Her home was a pretty stone cottage with a thick roof of straw. It was in a village in England. Roses grew around the open door .... Little Faithful's English home was as pretty as a fairy story. But her father often talked of going away to the New World of America, that Columbus had found, to live. They were all safe and comfortable in England, but they were not happy."

THE DUTCH AND THEIR SETTLEMENT OF NEW YORK

From Chapter III. "Little Wooden Two Shoes."

"Clump, clump, clatter! Here comes blue-eyed Gretel in her wooden shoes, with little tow-headed brother Hans after her. Wooden shoes were good for many things. Hans sailed his on the canal, like boats. Gretel used hers for dolly cradles..... Hans and Gretel came to America with other Duch children. They lived on a long, narrow island in the mouth of the Hudson River. The island poked its blunt nose into the ocean, so ships could come up to it."

BEAUTIFUL MANNERS OF FRENCH CHILDREN

From Chapter IV. "Shiploads of Politeness."

"Very near Holland lived other children who came to America. They were French. Their names were Louis and Jeanne..... When Louis and Jeanne said goodbye to their playmates their little faces were pale, their black eyes filled with tears. They kissed people, first on one cheek and then on the other. And they said: 'Adieu, cher ami!' That was French for 'goodbye, dear friend, we will never see you again.' French children were polite. Politeness means both kind feelings and pretty manners."

LITTLE PEOPLE WHO LIVED IN "SNOWBALLS"

From Chapter V. "Little Friends in Furs."

"They were Esquimos, a kind of small brown Indians. They were good-natured and friendly. It was so cold that they had to wear the skins of animals. They had soft, warm stockings made of eider duck skin, with the down inside. Their polar bear skin jumpers had hoods. Their high boots were of reindeer skin. Esquimo children were as warm and brown and greasy as buttered toast.... An Esquimo house had no windows, not even a hole for the smoke to go out. A bench around the wall made a table, a bed, and seats for just as many men, women, babies and dogs as could crowd into the hut. They could hardly see each other for the smoke."

AND THEIR FATHERS AND MOTHERS TOO?

NOONTIME IN THE AFRICAN JUNGLE

From Chapter VII. "The Black Children Who Lived in a Zoo."

"It was noon but the little boys and girls were all asleep, in the huts under the palm trees. No, they were not still asleep. They had got up with the sun, but when the sun was high and hot they went to bed again. Their fathers and mothers were asleep too.

The huts were as round as big sugar bowls. You might think there was sugar inside of them from the swarms of ants and flies. The walls of the huts were made of bark, the cone-shaped roofs of long palm leaves."

THE CHILDREN OF THE VIKINGS

From Chapter X. "The Children of the Vikings."

"The children have beautiful manners; never interrupt their elders and on getting up from the table say, 'Thank you, dear father and mother, for the good food,' and shake hands with them. From early childhood boys and girls learn to work. The hardest thing the girls have to learn is how to roll and bake the famous flat bread called knackbrode. It is made of barley meal rolled into sheets a half yard across as thin as paper and—the funniest thing—has a hole in the middle. For what do you suppose? So that mother can run a long pole through it and hang the bread from the ceiling. The boys tend the garden, catch fish, shoot game for the family table and drive the cows up to the high, glacier-fed meadows in the mountains."

A MOTHER'S BRAVE HUMOR

From Chapter XI. "The Miraculous Pitcher." (The Story of the Irish.)

"The potatoes made a small heap on the bare table. Father and mother just pretended to eat so the children could have enough. The mother said 'she didn't care for new potatoes until they got old'. That was an Irish joke. It made everybody laugh."

WHY THE IRISH SUCCEED

"The Irishman was such a good worker and so quick to learn new ways that he was soon boss of the other men. The children were sent to school. Tommy became a lawyer, Pat the Mayor of the city, and Larry a soldier. The Irish people always got up in the world when they came to America. In Ireland they had no chance."

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A HOSPITABLE HOME IN IRELAND.

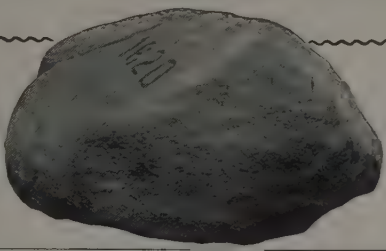
"Fine day, sir, and welcome."

FROM STEREOGRAPH © H. C. WHITE CO., N. Y.

SCENES IN JAPAN

1—Peasant and Mt. Fujiyama. 2—Flower garden. 3—Babies and big sisters. 4—Jinrikisha men and cherry blossom time. 5—Japanese Bed. 6—Combing out flax seed.

SCENES IN THE PILGRIM STORY



PROTECTED BY A GRANITE CANOPY AND BY BARS TO KEEP RELIC HUNTERS FROM CHIPPING IT AWAY, THE ROCK ON WHICH THE PILGRIMS LANDED STILL LIES AT THE WATER'S EDGE AT PLYMOUTH WITH THE DATE OF THE LANDING CARVED UPON IT.

The Mayflower has just arrived and its passengers are landing on the "bleak New England shores."

The Pilgrims sadly watching the Mayflower as it sails back toward the comfortable homes in old England which they have given up for "freedom to worship God."

Even when they went to church the Pilgrims were obliged to go armed to protect themselves against attacks by the Indians.

WIDFORSS

ANGEL LANDING, ZION NATIONAL PARK

natural scenery like this attracts thousands of visitors each year to the large National Parks the United States has set aside for the people. Alice saw wonderful spots like this when she was in Yellowstone Park.

TYPICAL INDUSTRIES

Editors Note to Mother and Teacher

And children coming home from school
Look in at the open door;
They love to see the flaming forge,
And hear the bellows roar.

In writing that verse into The Village Blacksmith, Longfellow expressed a profound truth. Children have a natural interest in the work of the grown-up world. They love to watch the blacksmith, the carpenter, the mason, the miller, the shoemaker. Boys, too young to work, follow the threshing machine from farm to farm. Village boys hang about the railway station to watch the locomotive and the grain elevator. They want to know how things are made, and what makes the wheels go 'round.

The experience of industry a boy can get in this way is considerable. Unfortunately, the workman doesn't want a boy around. He is in the way; often he is in danger. In any case, the industries near him are limited in kind, number and function. A flour mill is only one step in a long series of connected processes that produce the world's bread. Understanding of how any one man's work is bound to all the other work of the world, broadens the mind of the child wonderfully, and teaches him respect for every sort of labor.

To supply the lack of real objects of study, the following sketches were written. Children are nearest, in experience and interests, to primitive peoples. It is a curious thing that the very earliest occupations of supplying food, clothing, shelter and tools are still the fundamental industries, and must always remain so. Moreover, they are the most highly developed, and employ the large majority of workers everywhere. These facts have governed our choice of wheat and rice, iron, cotton, wood-working, pottery and glass-making as typical industries. The making of watches was added to satisfy the child's natural curiosity about machinery; and matches to set him thinking of the wonders of cheap, everyday necessities. We have connected all these varied industries with the school studies of geography, history, mathematics, drawing, chemistry, physics and astronomy, showing their practical use. A voyage into the World-at-Work opens a new and fascinating wonderland to the children.

MATCHES

VI. JUST TO LIGHT A FIRE

When the Puritans came to America they had to bring everything you could think of with them—even pins and needles and—matches?

Oh, dear no! There were no matches in those days, even in the old world. A tinder box was used to start new fires, and candles were lighted at the fireplace. It was a solemn thing to watch the father of the family start a fire. He took a little iron box down from the high mantel shelf. Inside of it were a bar of steel, a flint stone, a bit of charred linen, or "tinder," and a bundle of wood splints tipped with sulphur. He struck the bar on the stone. A starry spark flew off on the tinder. Slowly a glow spread over the tinder. It did not burst into flames, but became hot enough to set fire to a sulphur-tipped splint. The splint was thrust into a handful of shavings and the blaze carefully fed into a fire with kindlings and pine knots. It was such a trouble to start a fire with a tinder box that coals were kept over night under ashes. If a fire went out a little boy was apt to be sent with an iron kettle, a mile away to borrow fire of a neighbor. Hunters learned to start camp fires as the Indians did, by rubbing two sticks together. Why, even Washington, who died nearly two hundred years after the Puritans came to America, never saw a match. And now we can buy a box of matches for a few cents.

It seems very odd, now, that matches weren't made long before they were, for people knew all about the two things necessary for making them. They knew that friction, or rubbing or striking things together, make them hot. And they knew that phosphorus and some other chemicals catch fire very easily. But it was only about a hundred years ago that phosphorus was melted with other things, and then hardened in little balls on the end of wood splints. And even then the matches would not burst into a blaze when struck on a rough surface. With the first boxes of matches came a little bottle of acid. The match was set on fire by touching it to the acid.

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In this picture we see a man pouring the composition into the dipping tank You can see the tank which contains the composition and just above it the trays of matches on a revolving belt, moving over the tank so that the tip ends of the matches are dipped in the composition. They are then carried by the belt up into a blast of cold air which quickly dries the heads

Copyright by Brown Bros.

Here is a dipping machine which holds one million matches. It is officially known as the fastest machine in the world. It takes forty minutes to turn out a million matches.

Copyright by Brown Bros.

This picture shows a man taking the trays of completed matches from the belt of the dipping machine The girl then takes them into the packing room.

Copyright by Brown Bros.

Here we see a machine for making boxes. This machine turns out sixty thousand boxes per day. Th boxes are thrown by the machine upon a conveyor which carries them onto a chute. The chute leads t the floor below.

RUBBER

THE STORY OF THE INDIAN RUBBER BALL

There once lived two Indian children in a forest in Brazil, a country n South America. Near their rude hut home flowed a large river called he Amazon. One morning their father came home from a trip in the orest. He held one hand behind his back.

"Guess what I have," he said.

"A willow-tree whistle," replied the boy.

"A pretty bird's feather!" exclaimed the little sister.

"No," replied the father, giving them a small round object; "it's ball. Throw it on the ground."

The little boy did as his father had said, and both children were ery surprised when they found that the ball would bounce back in the ir. The father had given the children a rubber ball. It was the first ime that they had ever seen one.

"Where did you get it?" the boy asked.

"From a big tree out in the woods," replied the father. "Come ith me and I shall show you how to make one."

The children were very happy to know that they could learn how o make a new plaything, and they walked briskly along beside their ather. There were no stores in the woods where the Indian children ved. The people could not buy anything; they had to make everyhing they used. To the children the whole earth seemed like one huge orest, with a large river flowing through it.

The father led them to a large hevea tree — a tree that is as rge as one of our maples, or oaks, or pines, or beeches. He took a ig knife, which he always carried tied about his waist, and cut a long traight line in the bark of the tree. Then he cut a few slanting lines n each side of the main line, making them meet the central cut. When he was through the cuts looked like a fish's backbone, with the de bones attached; and, ever since, this form of tapping has been alled the "herring bone" tap.

In a little while the sap, called "milk," or lactate, began to flow rom the tree. It was somewhat pink in color, and a little thicker than

milk. The father gave the little girl a cup made of a cocoanut shell, and told her to hold it at the bottom of the long cut, and catch the "milk." Then he and the little boy built a fire of palm nuts and twigs.

"Come, Papa, the cup is full," called the little girl.

"We are ready," replied the father. "Bring the cup to the fire, and don't fall down and spill the milk."

All three gathered about the fire. The father gave each child a clean stick, and told them to dip the points into the sticky "milk," and then hold the points over the fire to dry and smoke the juice.

"If you let the 'milk' stand just as it flows from the tree, it will become sour," said the father. "Then you can not make a good ball. So you have to cure it by holding it over the fire and smoke, just as I cure meat. The heat and the smoke drive the water out, and cure or preserve the rubber."

By this time the liquid, watery fluid from the cup had become thick and sticky on their sticks; so they dipped the stick-ends into the cocoanut shell again, in order to get some more rubber "milk" on the ends. Then they held the sticks over the fire again. When they had done this a number of times they had a round ball of rubber on the ends of their sticks. Each child had made a rubber ball. The Indians called the rubber "cahuchu."

When the white men came to the forests of the Amazon, in Brazil, they were very surprised to see the Indians playing with balls that would bound, because white men didn't know about rubber at that time. They wished to send some of the rubber home to their friends, and bought some from the Indians. In this way white people gradually learned about rubber.

Before the Revolutionary War, which was fought when our great-great-great-grandparents were living, rubber was still a strange plaything, and about the only practical use it was put to was as a "rubber" to erase writing marks. That use of it gave it its name in English. Boys and girls of foreign lands — such as France and Germany — call rubber by about the same name that the Indians used.

After a while men learned that rubber could be made to cover cloth, and the product used as clothing to protect them against rain. And so rubber boots, coats, and hats came to be worn.

But even then rubber was not used very generally. The world had not discovered how to keep it from becoming sticky in summer and

les like this had to be cleared away before planting of rubber trees could take place. This picture was taken on the island of Sumatra in the Dutch East Indies on a plantation during the clearing operations.

down successive rubber piles. Picture shows the second step in building a tire.

This man is finishing a tire. He is putting on the final touches.

ing mill where rubber and compounds are mixed, rolled and kneaded together into thick rubber sheets. The man is adding a white compound to his batch of rubber on the big roller.

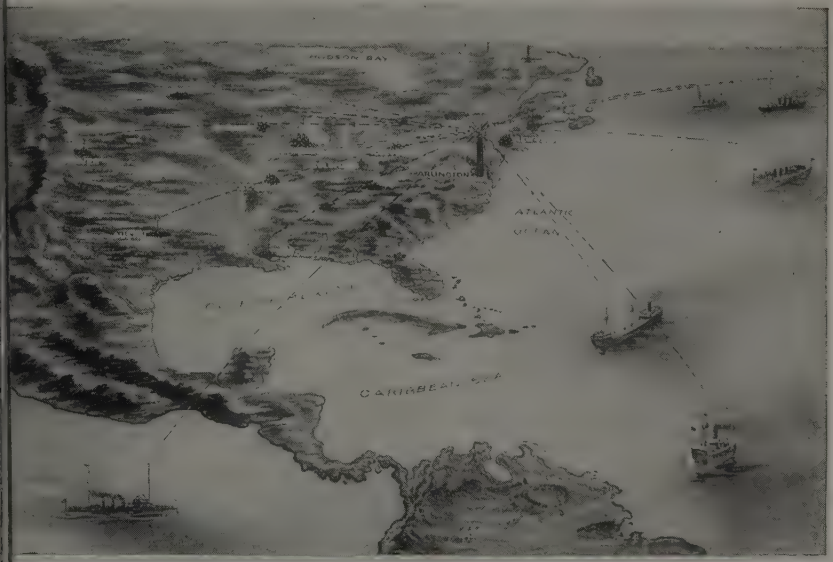
Pictures Courtesy of Goodyear Tire & Rubber Co.

Where tires are cured or vulcanized. In the pits or heater room. The men in the picture are just removing the lid of a heater.

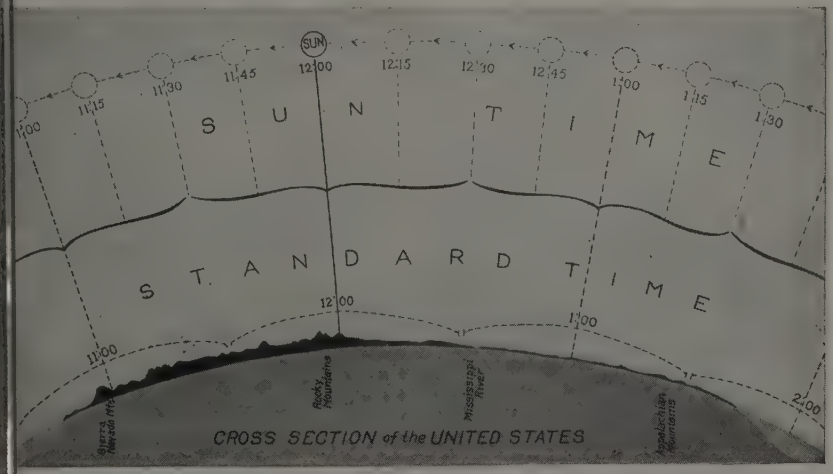
Final inspection. From the time rubber starts in the big milling machines until it finally emerges as tires, it must pass rigid inspections. Faulty tires are not put into stock.

Pictures Courtesy of Goodyear Tire & Rubber Co.

UNCLE SAM AND HIS STANDARD TIME



This picture shows how the Government helps people keep their clocks and watches uniform l over our country and on the ships at sea. The official clocks at Washington are regulated from bservations taken every clear night, of the position of certain stars, and on the following day at oon the time by these clocks is sent out.



As you see from the diagram, noon or 12 o'clock, is immediately below the Sun, according Sun Time, but if it were left to people's individual judgments, east or west of these points to the time of the day, there would be much confusion, which would often lead to disaster, in the running of railroad trains. So Uncle Sam divides the country into four sections and bitrarily fixes how far on either side of given meridians the time indicated by the Sun at those eridians shall extend. For example, the section on the West Coast takes its time from the 120th eridian; the section of the Rocky Mountain States from the 105th meridian; the Central States m the 90th meridian; the Eastern States from the 75th meridian. This is called Standard Time, d differs from Sun Time at all points east and west of these established meridians.

COINING DAYLIGHT INTO DOLLARS

Just think what it means to turn the hands of time forward for an hour across a whole continent! That is exactly what Uncle Sam did at 2 A. M. on the last Sunday in March, 1918. And presto! As if my magic, our whole great nation of 100,000,000 people changed the order of their lives. Perhaps you have found it a little hard sometimes to get up an hour earlier than usual, but just think of getting a large proportion of 100,000,000 people out of bed an hour earlier, beginning on a certain day. This is just what our Government did with its Daylight Saving Law. Without a hitch, without the slightest confusion or disturbance, the whole machinery of life and business began moving on the new schedule, and literally, "coining daylight into dollars." It had previously been found that the restriction by government order of the use of electrical display signs to certain hours amounted to a saving of 8,000 tons of coal per month, or over 400,000 tons per year. Under the Daylight Saving Law the decreased use of artificial light in homes and public places meant an annual saving in coal alone of several million tons; while the total economy, including the saving of oil used in lamps and the manufacture of gas was estimated by the President of the American Association for the Advancement of Science, at $25,000,000. The law covered the six months from March to October. Opposition of the farmers who found it impractical in connection with farm help caused its repeal in 1919.

WATCHES AND CLOCKS

IX. BROWNIE TICK-TOCK AND THE STARS

It's great fun to hold a watch up to a baby's pink ear. He is so as-ton-ished by the busy tick-tick-ticking. One little girl remembers thinking a Brownie did the ticking, and that the mouse that ran up the clock did the striking. When the little gold back doors were snapped open, she fully expected to see a live playmate pop out. Before any child can talk plain he wants to know what makes the wheels go 'round.

Once there were only clocks, and clocks without ticks, at that. A clock without a tick seems as odd as the smile without a cat in Alice in Wonderland. In pictures, Old Father Time carries an hour-glass clock. In an hour-glass it takes just one hour for the sand to run through a little hole from one hollow glass cone to another. It is wound up by turning it over at the end of every hour. Really, Father Time ought to carry the sun, or a bunch of fire-cracker stars. They are the oldest and best timekeepers.

If you were to stand still, all day, in a sunny field, and watch your shadow grow shorter, up to noon, then jump around to the other side and grow longer until sunset, you might think of making a shadow clock, or sun-dial. A sunbeam, shining through a hole in a roof, makes a moving golden spot on the floor below. If you ever go across the ocean to the old world, you may see stone sun-dials in castle gardens, and clock-faces in the marble floors of great churches. Shadows and sunbeams were the first hour hands.

In old, old times people didn't have to catch trains, nor little children go to school, so minutes were not very important. But they did want to measure the exact length of eclipses of the sun and moon. A little over three hundred years ago, a great astronomer named Galileo was in a church, when some one bumped into a hanging bronze lamp and set it swinging. Back and forth it went, back and forth, as regularly as—guess! The pendulum of a grandfather's clock. When it slowed down and stopped—when "the old cat died," as you say when you stop swinging, he started it again with a push.

IRON

III. THE LITTLE PIG THAT GOES TO MARKET

Oh! The baby's little big toe! No, that is just a play to amuse the baby. This is a *real* pig. Then, it's "the squealy little fellow that pays the rent" of the Irish farmer. No, again. That pig is not sold until he is big and fat or he wouldn't bring much money. Another guess—pig iron.

Pig iron! Who ever heard of such a thing? Your papa has, for one. Ask him. Pig iron gets its name in the papers every day, just as wheat and cotton does. Turn any daily paper over to an inside page of fine print headed "The Markets." There you will find the prices of things people have to have, and that are bought and sold every day. Wheat and other grains and flour fill two columns; live stock or cattle, sheep and hogs one column; produce, such as butter and eggs, one column; cotton half a column; metals: ah, here it is—copper, tin, lead, iron. It says: "*The Iron Age* will say tomorrow: Pig iron is rising in price. The iron ore fleet of ships is all on the lakes. Rolling mills are working day and night shifts. Great activity in all lines of iron manufacturing."

What is pig iron? What does it look like? Where is it found? It isn't found. It is made of iron ore, as flour is made of wheat, although in quite a different way. And it looks something like a round, gray stick of stove wood. The story of iron—how it is mined and turned into a pig, how it goes to market and what happens to it afterwards, is long and thrilling.

There is iron in every country in the world. It is all through the earth, the soil, the water and the rocks, and in plants and animals. Some spring water tastes of iron, and is colored brown by it. When iron rusts it turns red. So soil that holds a good deal of iron dust is red, or red brown. Red tile and brick clays are full of iron, and there is iron in your red blood. Doctors give you iron tonics when your blood is too pale. And they tell you to eat spinach and other very green vegetables, because they have iron in them.

Iron is never found in lumps so a blacksmith could dig a piece out of the ground and hammer it into a nail. But in the rock layers

ourtesy of Inland Steel Co.

THE ORE—This picture shows a pile of iron ore at a mine in the Mesaba country in Northeastern Minnesota. This egion is noted as containing the greatest iron-ore deposit thus far discovered in the world, and also because the ore near the surface and easily mined. There are several hundred thousand tons of ore in that pile awaiting shipment. ppliances for loading are so perfect that the train of forty cars which you see standing there can be loaded in a few hours.

urtesy of Inland Steel Co.

RANSPORTATION TO THE MILLS—Then comes a run at high speed to the head of Lake Superior, only sixty- e miles away ending at the world-famous ore docks. Here a pull of a lever opens the hopper gates of each car, and e whole train can be unloaded in two minutes. The ore is run through the "pockets" of the ore dock into the hold a great ore steamship, five thousand tons of ore being loaded in thirty minutes. The vessel carries the ore to the docks of the great steel mills to which it is consigned. The picture shows a great steel steamer as long as a city ock unloading at the docks of the Inland Co., at Indiana Harbor, near Chicago. Here by machinery "grab buckets" lowered into the hold of the ship; instantly each bucket grabs about seven tons of ore and is whirled upward to the dge above. Thus ten thousand tons of ore are unloaded at this dock in a single day.

Courtesy of Inland Steel Co.

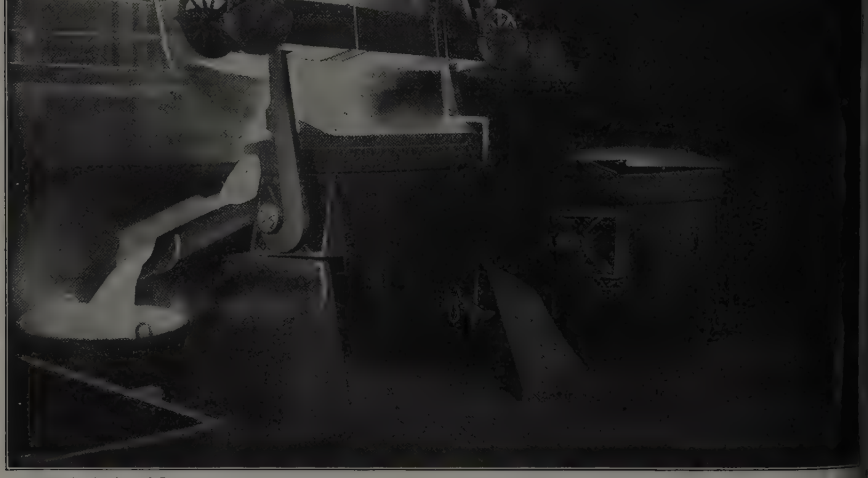
SMELTING THE ORE.—The first process is melting the ore in a blast furnace, in order that the iron may be separated from the earthy matter. This is called smelting. A blast furnace is a huge retort built from fire brick, inside a heavy steel jacket. In the picture you see the blast furnace behind the inclined railroad. It is 85 feet high. It is charged by dumping into it first a charge of coke, next a charge of limestone, to act as a *flux* that is to make the ore melt and flow more quickly, and then several tons of ore. The combustion of the coke is aided by a fierce blast of hot air which is forced through it securing a heat of 3000°, which is necessary to melt the ore. The white hot liquid iron sinks to the bottom and is drawn off; the impurities pass off in slag and gases. Every twelve minutes, day and night, a charge is made by means of steel "skip cars" which run up the inclined railroad and dump their loads into the top of the blast furnace. The four tall steel tanks on the left in the picture are called stoves and are filled with a checker work of fire brick. Waste gas from the top of the blast furnace is carried into these stoves and furnishes a heat which brings the fire brick to a white heat. The gas is switched off, and cold air forced through is heated to 1000° by the white hot brick. It is then driven to the hearth of the blast furnace and assists in reducing the ore.

tesy of Inland Steel Co.

PPING THE BLAST FURNACE—In this picture we see the lower part of the great blast furnace. white hot liquid iron sinks to the bottom and, freed from the slag, it is tapped and flows out, as you see he picture, and is carried into huge brick-lined ladles. Each ladle holds twenty-five tons. Each ladle on its own little car and the whole train load is filled at one heat. This train is run direct either to the n hearth furnace or to the pig-casting machines.

Courtesy of Inland Steel Co.

THE PIG IRON CASTING MACHINE—By the old way of making pig iron, it was run out of the furnace mouth into a series of long canals in a sand bed and from these canals into little laterals, where it cooled in "pigs." This method is now displaced by the pig-casting machine. It is a long endless belt with steel buckets on it, each bucket being a mold for a 100-pound pig of iron. As we see in the picture. the ladle car is brought to the casting house, the ladle dumped by electricity, and the molten iron runs through a trough into a moving bucket conveyor. As the buckets move upon a 200-foot incline the molds are drenched in a flood of cold water. At the upper end the pigs are dropped into a car which is flooded with water, to keep it from catching on fire. Pig iron thus cooled is dumped onto a stock pile to be carried to the open hearth furnace when needed.



Courtesy of Inland Steel Co.

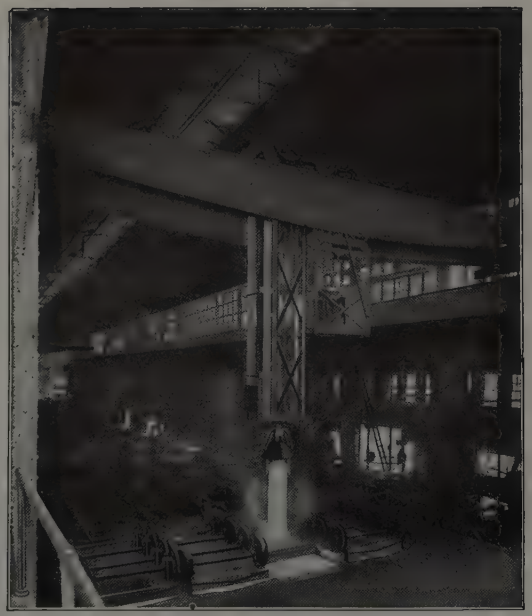
THE POURING SIDE OF OPEN HEARTH FURNACES—Instead of making into pigs as above described, the molten iron is generally carried in the ladles, direct to the Open Hearth Furnaces. On one side of the row of furnaces is the charging floor. A huge overhead charging machine travels the length of it. A quantity of limestone is spread on the floor of the furnace, then come the ladles carrying the seething mass of red hot iron from the blast furnace The lower door of the furnace is closed and this molten mass is poured in through an upper door provided for the purpose. In this furiously hot furnace, which reaches 4000 degrees of heat, the iron ore is freed from its carbon, phosphorus and sulphur. Then, since steel must have carbon in it. just the right amount of carbon is added to the melt.

Courtesy of Inland Steel Co.

POURING THE INGOTS—When this open hearth steel is done to a turn, it is drawn off into a huge ladle suspended from the overhead traveling crane. The ladle then moves along the row of ingot molds which you see in this picture. A small trap at the bottom of the ladle is opened and one after another of these ingot molds is filled with the molten steel. The molds stand on waiting cars and when filled they are pulled into the yard where, after they have sufficiently cooled, they are run under the "stripper."

Courtesy of Inland Steel-Co.

INGOT STRIPPER—The stripper is a powerful machine that pulls the mold off the ingot. Enormous steel grippers descend and grip the mold near the top, lifting it from the car. Then a steel ram descends and pushes the ingot out through the bottom of the mold, leaving it standing on end, still red hot, on the car, passing on to the next mold till the whole row stands stripped and glowing.



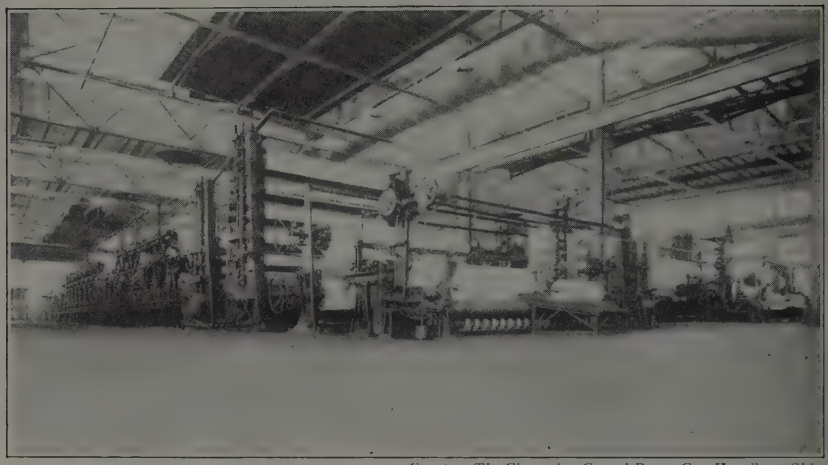
LOWERING AN INGOT INTO THE "SOAKING PIT" — The train of red hot ingots goes on its journey into the rolling mill. Here is a row of "Soaking Pits" sunk into the ground. They are made of fire brick and heated to a white heat. An overhead crane grapples an ingot from its car and lowers it into the soaking pit. This operation is repeated until each of the pits has its full load of ingots in soak Here the ingots are brought to a white heat and when ready are lifted out and swung over onto the table of the blooming-mill.

Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

These bales are composed of wood pulp. Spruce and other kinds of trees are ground very fine, the small particles "cooked" and put up in bales.

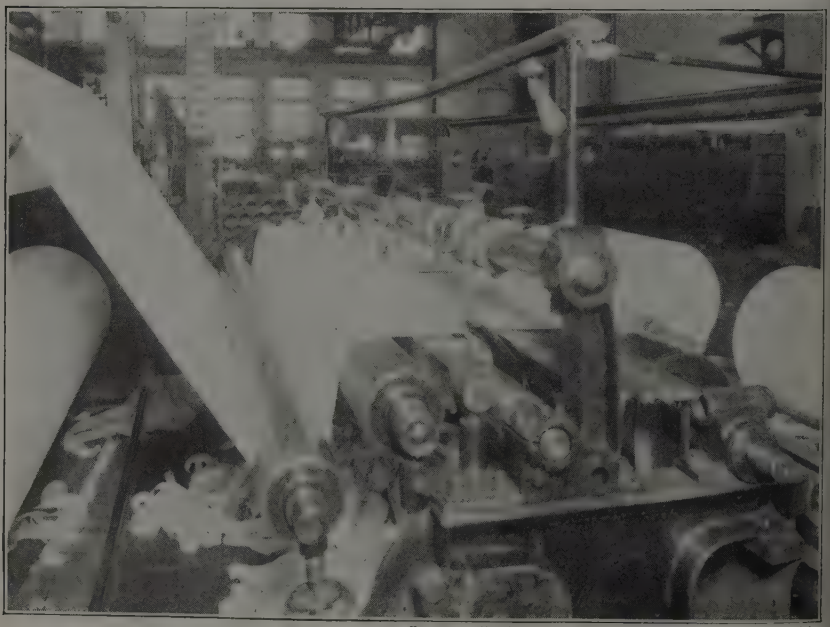
Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

Wood pulp being beaten in great vats, with a large quantity of water. One man in the picture is feeding the wood pulp in a vat. After many hours the pulp looks like skimmed milk.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

From the vats the pulp is put on a draining screen, and then fed into this machine, where, between a long series of rollers the pulp is gradually pressed and dried into sheets of paper.



Courtesy The Champion Coated Paper Co., Hamilton, Ohio.

This is a close-up view of the paper going over and under the final rollers, and being wound on spindles, in which form newspapers and magazines buy the paper.

R. H. Tallant *Courtesy of Dr. Stephen T. Mather*

DREAM LAKE, ROCKY MOUNTAIN NATIONAL PARK

Alice, when she arrived in Switzerland, saw high snow-capped mountains. Many times at the foot of these mountains were lakes so clear you could see the stones on the bottom of them. Out in our own Rocky Mountains there are clear, beautiful lakes, like the ones Alice saw. Dream Lake is in one of the National Parks, which some day you may visit.

WONDERS OF THE WORLD WE LIVE ON

I. LAND

When you went around the world you found that this earth we live upon is made of just land and water. But what a number of things were made with them. No two countries looked just the same, but they were all beautiful and interesting. Do you want to know how they came to be so different?

You need not go around the world again to find out, but it will help you to understand everything better if you will remember what you saw—the grassy plains, the high, rocky mountains, the green river valleys, the sandy desert. No matter where you live on the earth, there is land and water. In any wood or field or city park you can find out a great many of old mother earth's secrets.

This is a perfectly flat meadow, isn't it? It is covered with grass and flowers. Here is a pond, with water-flags and cat-tails and pussy willows growing about it. The water is as still as if it lay in a wash basin. No, there is a ripple on the other side. A little stream, almost buried in grass, is flowing in there. The water runs very slowly. The land on that side slopes a little toward the pond, or the tiny stream could not flow into it. Water never runs any way except down hill. Here is another little feeder to the pond, and another! Here the water runs out of the pond, through a larger brook. The meadow isn't flat at all. It is made up of little slopes. The pond is a small lake. Some lakes are hundreds of miles long, but they were formed just like this pond. The water from them flows out through a big river, instead of through a little brook. They are fed by many small rivers, and by springs underneath, too.

Wherever a pond or a lake is made on land, there must be a low place shaped like a bowl, with the land sloping down on all the sides but one. But sometimes, for hundreds of miles, the land slopes from only two sides, making a trough between. There you would find, not a lake, but a river. When the river is very long and deep, like the Mississippi, its valley is hundreds of miles wide. The slopes rise slowly, but they rise high, to the very tops of mountain ranges. Many big streams run down these long slopes to feed the main river,

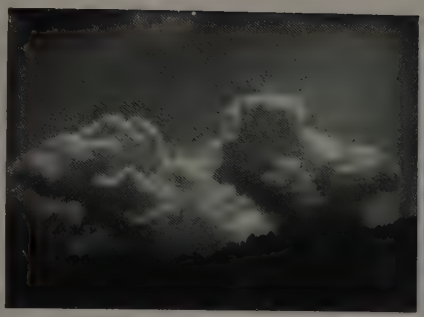
drops. If the night is very cold when dew forms, the little dew-drops are frozen on the plants. Then we have Jack Frost.

Jack Frost is busy with you, too. He takes the vapor of your breath and per-spi-ra-tion, as you lie warm in bed, and makes pictures with it on the cold window pane. Such pretty pictures! They are all mosses and ferns and grass spears, and spangles to trim fairy queen's dresses.

Cold is a wonderful artist with water. It makes snow crystals and hailstone pearls. Hail is made when the air is at the freezing point of water while snow is formed when the air is below this point. It may even snow and rain at the same time; the moisture first forming into snow in the cold air of the upper regions and then turning to rain as it passes through air warm enough to melt it. It frequently snows on the mountain tops while it is raining in the valleys.

The Indians called pop-corn the corn that flowers. So snow is moisture that blossoms. Next time you see a quiet snow storm, when the snow falls in large soft flakes, ask your mother for a piece of black velvet or cloth. Put it out of doors to get cold, but keep it dry. Then catch some snow flakes on it and study them through your pocket microscope. Most of them will look like little broken feathers. But if you are patient, you will be sure to find some that are perfect, six-pointed stars. The points will be veined and fringed like the petals of a flower. All snow flakes should be six sided or pointed crystals. Most of them are torn by the wind, or get their points knocked off by falling against other flakes.

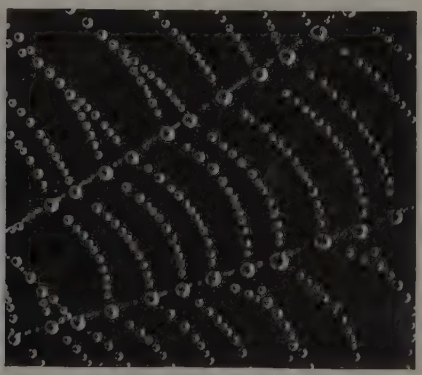
Hailstones are made in quite a different way from snow flakes. Snow falls only in the winter, but hail storms come in summer, on hot days. Weather men think that when rain drops are formed in clouds, and are all ready to fall, they are suddenly pulled up much higher, into freezing air. The rain drops freeze but do not burst. Then they fall through other rain clouds, and more water freezes on the balls of ice. They are tossed up and down until they become so heavy that they drop like bullets. They drop so fast that they pass through the warm air near the earth without melting. Sometimes they are as big as pigeon's eggs. Find a very big one, some day, and ask papa to cut it across quickly, with his strong knife. You will find that the hailstone was made in layer rings like a lily bulb. The oyster makes the beautiful pearl in the same way. Around a hard center it puts layers of the pearl with which it lines its shell house. The hailstone pearl is just as beautiful as the shell pearl, but it melts so fast it is hard to study it.



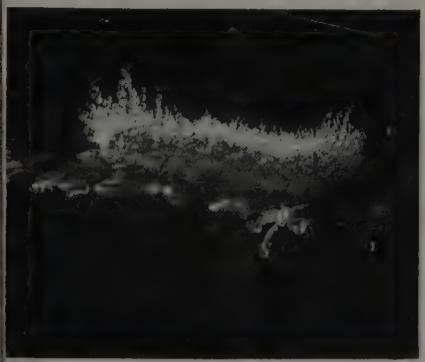
CUMULUS, A LIGHTLY FLOATING FAIR WEATHER CLOUD.

THUNDER SHOWER CLOUD.

DEW-LADEN FLOWER AND BUDS OF THISTLE.



SECTION OF DEW-LADEN SPIDER'S WEB.



SLEEPING CATERPILLAR DECORATED WITH DEW-DROPS.

DEW-LADEN GRASSHOPPER ASLEEP ON BED OF FLOWERS.

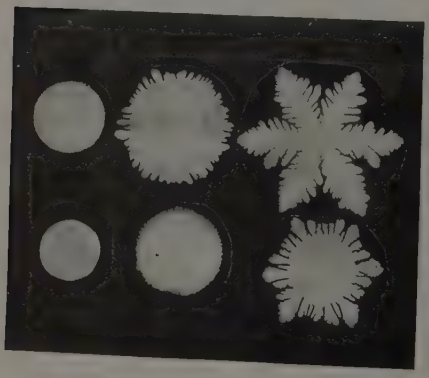
The wonderfully beautiful photographs of dew and frost and also of snow crystals which we present, were furnished for this volume by Mr. Wilson A. Bentley, who is recognized as the pioneer in microphotography, and who has been employed by the government in this work for many years.

HOAR FROST ON BLACKBERRY LEAF.

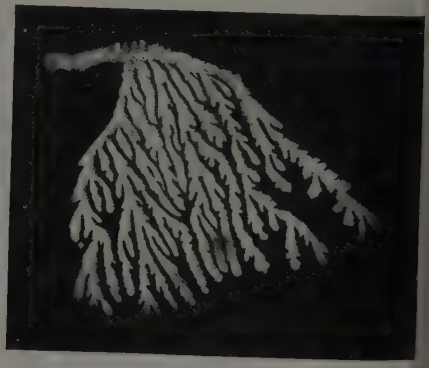
HOAR FROST ON GRASS BLADE.

FEATHER-FERN FROSTWORK ON WINDOW.

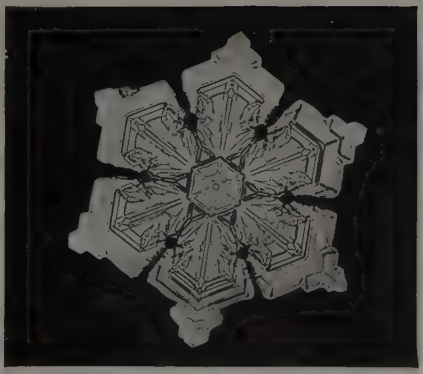
SCROLL FROSTWORK ON WINDOW.



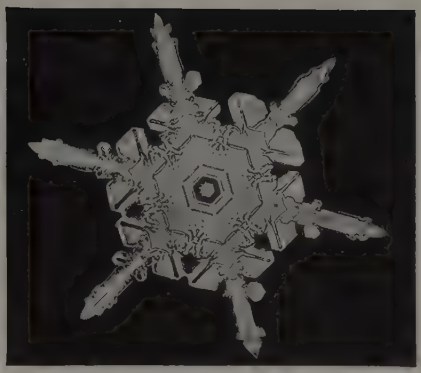
DEVELOPMENT OF ICE CRYSTAL FROM SMALL ROUND TO LACE-LIKE FORM.



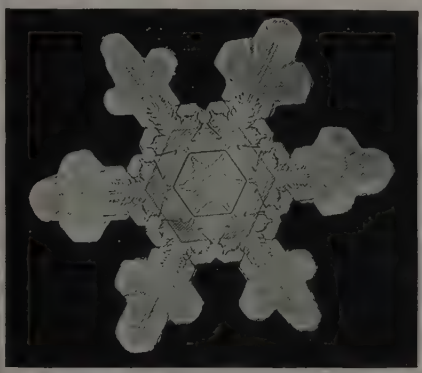
CORAL-LIKE BRANCH SHOWING FEATHER TYPE IN DETAIL.



BEAUTIFUL HIGH ALTITUDE CRYSTAL.

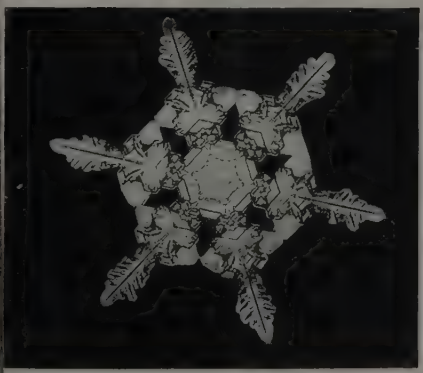


JEWELLED CENTER.



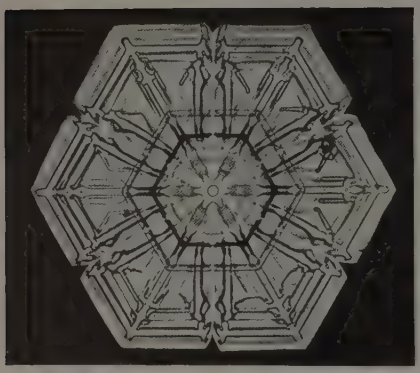
A BEAUTIFULLY ETCHED CRYSTAL.

FEATHERY LOCAL STORM TYPE.



LOW ALTITUDE TYPE.

HIGH AND LOW ALTITUDE COMBINED.



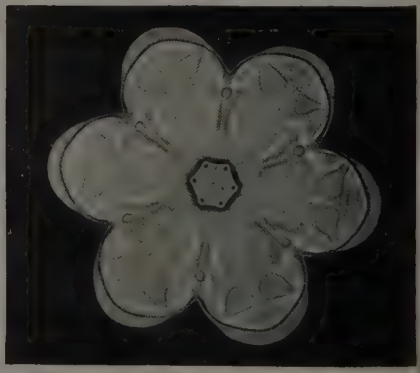
A RARE BEAUTIFULLY ETCHED CRYSTAL.

ELABORATELY ETCHED DESIGN

BEAUTIFUL STAR-SHAPED DESIGN.

PRISM-LIKE CRYSTAL FROM HIGH ALTITUDE.

COLD HIGH ALTITUDE.



SOLID HIGH ALTITUDE CRYSTAL.

III. AIR

Besides land and water on the earth, there is something that is all around it, and all through both land and water. You cannot see it, or feel it, or taste it, or smell it, or hear it. But you can prove that it is all around you in a great many ways. You can take it to pieces, too, and find out what it is made of.

Measure your chest with a tape line. Twenty-eight inches? Now breathe deep, deeper. Hold your breath and measure again. Thirty inches! You filled your lungs with air. They were just as full of air as this glass pitcher is of water. This drinking glass looks as if it was empty, but it is full of air. Turn it upside down, and press the open end on the top of the water in the pitcher. Push it straight down under the water—steady; don't let the glass tip up. The water rises outside the glass and overflows. Lift the glass carefully. It is dry inside, except for a narrow rim at the top. Some water did get inside, by squeezing the air in the glass into a little smaller space. See how much water was forced out of the pitcher. Nearly a glass full!

Big boys who dive and swim under water, fill their lungs with air first and hold their breath, so water cannot get into them. That is a very useful thing to learn to do. It saves people from drowning and makes them able to save other people.

Have you ever heard people say: "As light as air?" Perhaps you think air doesn't weigh anything. Did you ever pump water from a well by working a pump handle? You had to pump several times before the water came, didn't you?

THE STORY OF LIFE

PART I—PLANTS

EDITOR'S NOTE TO MOTHER AND TEACHER.—Often, before he can talk plainly, a little child has some sense of the mystery of life, in himself, his playmates, his bird and his dog. Later, he recognizes that the flower and tree are alive, too. He asks endless questions about life, its nature and origin. Any child old enough to put a little brown seed into the ground, with confidence that a flower will grow from it, or who sees a downy chicken or crying bird come from a shell, has a natural curiosity about them that should be and can be satisfied.

He can comprehend that all life reproduces itself by means of seeds and eggs, and grows from these simple seeds into the more complex form of the fully developed offspring. To learn this in the right way is now recognized as the most serious requirement, as it has always been one of the most difficult problems, of his education.

In this "Story of Life" we compare the forms and functions, first of plants, then of animals, from the lowest, simplest types to the highest and most complex. So far as the editors are aware, this is the first attempt ever made to present Biology, or the Science of Life, to little children, and to show them some of the more striking resemblances among plants and animals which point toward a common relationship to one Great Source. The stories are as fascinating as fairy tales. They open up to the child, a new world of wonders; a world of intelligent plan, of order, of beauty and of the brotherhood of living things. They teach reverence, sympathy, and a sense of the worth and sacredness of all life.

Because of its appeal to the imagination—particularly of the young and in the treatment of a difficult scientific subject—the dramatic form of expression is here frequently employed; as "The Earthworm Puts on Armor." But the discussion of any particular theory has been purposely avoided, because we believe it would be out of place, and because these great and sacred truths, upon which we all agree, seemed to us of so much larger importance.

THE STORY OF LIFE

PART I.—PLANTS

We Meet the Fairy Godmother
How the Yeast Plant Grows in a Loaf of Bread
Sailor Plants and Robinson Crusoes
Water Babies that Live on Land
Pigmy Plants and Their Wonderful Labors
How the Ferns Grew Bones and Babies
How Fairy Fungi Turned into a Dandelion
Why Plants Are Like Squirrels
Plants Have Visitors and Travel Abroad
How Plants Are Promoted to a Higher Class

PART II.—ANIMALS

The Little Animal that Walks with Its Stomach and Eats with Its Feet
Water Babies that Live in a Village
A Sea Flower that Eats with Its Petals and Moves When It Wants to
The Web of Life: Mother Nature at Her Loom
The Star Fish and Sea Urchins that Play with Live Dolls
A Long Speech by a Little Worm
The Earthworm Puts on Armor
How the Worm in Armor Counts by Twos and Threes
Mr. Crawfish and His Table Manners
The Crawfish, the Spider and the Fly
Why the Crawfish Crawled into a Shell
The Oyster Learns to Swim
The Oyster-Fish that Climbed on Shore
Birds of the Water and Birds of the Air
Water Babies and Other Babies that Drink Milk

PART I—PLANTS

I. WE MEET THE FAIRY GODMOTHER

What if you had never seen an apple, or an apple tree! Little Esquimo boys and girls never saw them. So, just imagine that you never saw them, either.

Then, if a traveler from a strange country should bring you a little brown seed, a green leaf, a pink blossom, a bit of the wood of the apple tree and of the bark, and a juicy red apple to eat, and should tell you that they were all parts of one plant and had grown out of each other, and were made from one common food, what would you think? Very likely you would say: "What a lovely fairy story. Please tell another one."

If he were a very wise man he might say: "Very well, here's another one just like it." He would ask you to look at baby brother. Even Esquimo children have baby brothers. See his dewy, pink satin skin. Feel the soft flesh under it, and the hard round bones under that. Feel his loving little heart beat. Look into his merry blue eyes; brush the sunny curls on his head, and let him bite your finger with his pearly teeth. Watch mama cut the shell-pink finger nails that can scratch like pussy's. Those things—skin, flesh, bones, heart, eyes, hair, teeth and nails—all so different, are all a part of the baby. They are all fed and made to grow on just one food—milk. Then, maybe you'd be able to believe that the apple tree might be a really, truly story.

And that would help you understand that all living things—plants and animals—the baby and the apple tree, all of them came from seeds, and are sort of far-away cousins to each other. Isn't it pleasant to think that we are related to butterflies and birds and apple blossoms? Only children, and a few very wise grown people, can understand how this can be. Children can imagine things. They can imagine what fairies would look like if there were fairies. So they can understand the wonderful true stories that science tells, about things as strange as fairies. And then children are curious, and it is easier for them to change their minds. That makes their minds

II. LITTLE LION TOOTH AND ITS COUSINS

In the spring, the grass that bordered the cement walk around the wild garden was not two inches high before it began to be dotted with the golden rosettes of the dandelion. When the warm fingers of the children closed around a bunch of short stems, the flowers soon closed into green-sheathed buds that refused to open again. So a boy who didn't like to come to school, but who did like to roam in the fields and woods, was sent to bring in a whole plant. He was gone an hour, but he brought a fine plant, and such a fine story of how he got it that he fairly ran back to school.

At first he tried to pull a plant up by the root. But the flower stems and leaves broke away. Then he dug around the base of a plant a little way, and got hold of the crown of the root. That snapped an inch below the ground, breaking off a stout root half an inch thick. At last he went home and got a long, thin-bladed, table knife, that he sank in the soil to the handle and slipped all the way around the root to loosen the soil. When he pulled, the root snapped six inches under ground, leaving the tip buried there. Then, for he was a clever, determined boy who wouldn't give up, something like a dandelion in that, he dug a trench around the plant and sank the knife deeper. He tried six times before he got a whole, unbroken root. But he got it!

"Bravo! Stout little lion-tooth; you know how to hold on!" said the teacher, clapping her hands. The children were puzzled. Did she mean the boy or the plant? Perhaps both.

"Lion-tooth?" cried a dozen excited voices. Why, yes. The French people long ago noticed that this wayside flower has a narrow, tooth-notched leaf, so they called it *dent-du-lion*. In England, where the meaning of the name was not known, it was changed to dandelion. You know a tooth doctor is a *dent*-ist. Very likely the lion part of the name was given because this kind of plant is king of all plants, as the lion is king of the animals. The English people had a name of their own for it. They called it Peasant's Clock. A peasant is a farmer. Farmers have to get up early and go to bed early. The dandelion opens its yellow eye at four o'clock and shuts it at eight or nine—a very good clock for farmers. Another old

DANDELION, SHOWING PLANT, FLOWERS AND SEED HEADS

TREES

PART II

A YEAR IN THE FOREST

EDITORS' NOTE TO MOTHER AND TEACHER.—Do you remember Eagle Heart, the little red American boy? His home was in the forest. We cannot find such a beautiful forest in our country today, as the one he lived in. No big tree had ever been cut down, except by the beaver dam-builders. The Indians had only stone hatchets. They used poles and bark to make their wigwams and canoes. For fires they used fallen trees and branches and dry brush. They were careful to put out their camp fires, so that very few forests were burned.

In the old world the woods had been cut over, and only the best timber and orchard trees replanted, for many hundreds of years. It was a very great wonder to white people who came to America, to see hickory, walnut and ash trees, oaks, maples, beeches, elms, poplars, willows, birches and wild fruit trees, flowering shrubs and vines, and even pines and other evergreen trees growing together, in the most natural and friendly way. In any bit of wild woodland, in any city park, and on village streets and lawns, you can find most of these trees, and some others that Eagle Heart never saw at all. White people brought the beautiful horse chestnut, and the tall, slim, Lombardy poplar and other trees, from their old homes.

How many of these trees do you know? Eagle Heart knew and loved all the trees in his forest home. Perhaps you know several of them in the summer, when the leaves are on, but he knew them in every season of the year. He knew their height, their color, their spread of limb. He knew their bark, their leaves, their flowers and fruits. He knew where each kind of tree liked best to grow, and what animals and birds and insects used it for a home. And he knew the forest as a whole, in all its seasonal changes.

After three hundred years of cutting down trees, we have begun to re-plant and protect them. Even the schools have a tree-planting or arbor day, so little citizens can help in the work of winning back our lost trees. The more you know about trees, the more you can help in this work. Don't you want to know and to love them as Eagle Heart knew and loved them? The first thing to do is to visit trees, and make some pictures of them with your little kodak eyes. (See ARBOR DAY, FOREST RESERVE, FOREST-SERVICE, LUMBERING and the names of different trees.)

PART III—INSECTS, ETC.

I. MRS. MUSCA DOMESTICA CALLS

"Were you speaking of me? Here I am."

A very dignified little visitor, about a quarter of an inch long, drops "out of the nowhere" in the most surprising way! But she is very polite about ringing a little buzzing door bell to let you know she is coming. "Buzz-z-zip! I'm Mrs. Musca Domestica!"

What a name for such a little creature! One of the capital letters of it would almost cover her, and the length of it would make a nice distance for an evening stroll.

"It's just Latin for House Fly," she says. "Don't you think I deserve it? I come into the house whenever you leave the screen door open. I'm neighborly and don't wait to be invited. I'm very fond of human society. You have such nice things to eat. But you are not very friendly," she added reproachfully. "Actually, I've had the door shut in my face, and been 'shoo-ed' out like a hen."

A house fly magnified.

"Well, you're not very clean, you know. You go to dirty places, and you don't wipe your feet."

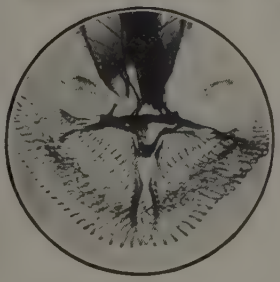
"I would if I had a door-mat, I would, indeed. I wash my face and brush my clothes oftener than you do. Just watch me."

There she sits at a respectful distance, rubbing her little front hairy legs together vigorously. Then she balances herself on the other four, and rubs the hindlegs. When the middle pair are cleaned, she draws a leg across her mouth to wet it, and washes her face like a cat. Finally she flutters her silver gauze wings to shake the dust off. As a delicate hint she nibbles at a clean plate.

"Don't human people ask their visitors if they care for refreshments? Thank you! A grain of sugar is my favorite lunch. You may watch me eat, if you won't come too near."

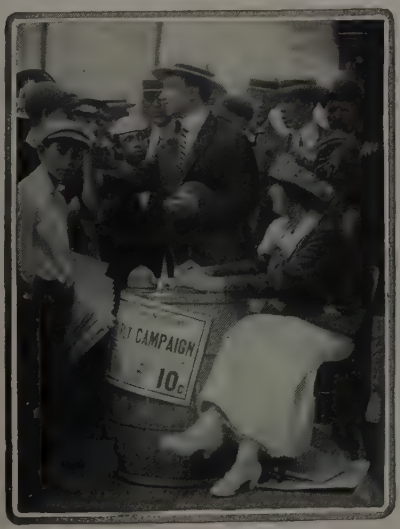
HOW A LITTLE FLY STARTED A BIG WAR

This picture shows Professor C. F. Hodge, inventor of the fly trap, and a heap of dead flies, of which sixteen million were caught in the campaign he conducted in Worcester, Massachusetts.



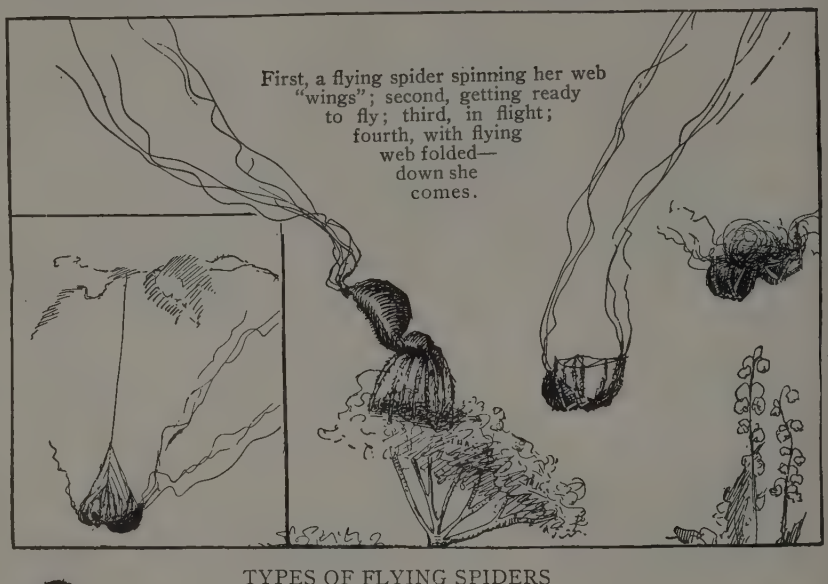
These fly traps were used on garbage cans and kitchen tables.

Next to the "heap of the slain" before which Dr. Hodge is standing is a picture of a fly's foot and below it, in the circle, a fly's tongue as they look under the microscope. It is with his unclean tongue and feet that the fly spreads disease.



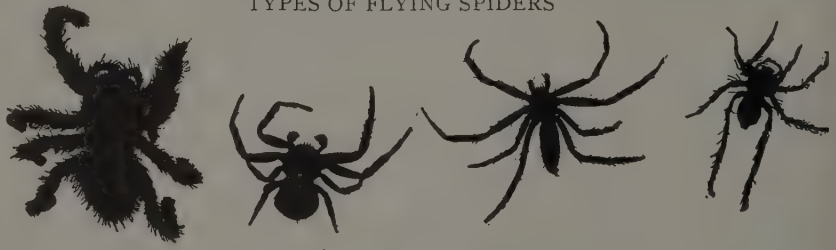
The great city of Cleveland, with the help of the newsboys and the school children and Dr. Hodge's fly traps, got rid of its flies in one season. The city paid ten cents a hundred for dead flies and as many as 25,000 were bought in an hour.

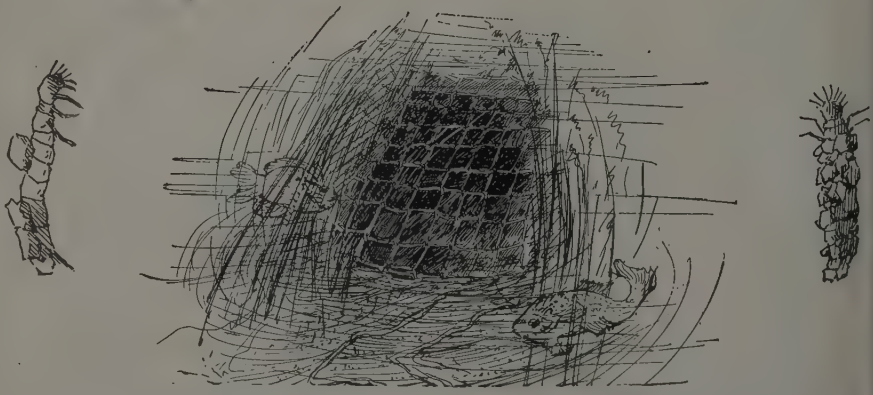
WEBS FOR FLYING AND FISHING



First, a flying spider spinning her web "wings"; second, getting ready to fly; third, in flight; fourth, with flying web folded—down she comes.

TYPES OF FLYING SPIDERS





Strange little spinner under the water! This is the caddis worm—larva of the caddis fly. She spins a silk tube and across the entrance a web (here greatly magnified) with which she catches little water people, as spiders catch flies. When outside of her "suitcase" she drags it about with her. Small shells and gravel stick to her and her case.

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FROM BIRD GUIDE © CHARLES K. REED, WORCESTER, MASS.

COMMON BIRDS IN THEIR NATURAL COLORS

Song Sparrow
Wood Pewee
Kingbird
Scarlet Tanager
Rose-breasted Grosbeak
Phoebe
Cowbird
Bobolink
Wilson Thrush
American Redstart
Purple Marten
Blue Jay
Catbird
Indigo Bunting
Orchard Oriole.

. E. COMPTON & CO. FROM BIRD GUIDE © CHARLES K. REED, WORCESTER, MASS.

COMMON BIRDS IN THEIR NATURAL COLORS

cker
nebird
llow-bellied Sapsucker
ipping Sparrow

Cardinal
Belted Kingfisher
Cedar Waxwing

American Goldfinch
House Wren
Wood Thrush

Red-eyed Vireo

Red-breasted Woodpecker
Oven-bird
Red-winged Blackbird
Humming Bird
Meadow Lark

PART IV—BIRDS

A BIRD-LOVER'S OUTDOOR AVIARY

EDITORS' NOTE TO MOTHER AND TEACHER.—Your mother and grandmother can remember the time when it wasn't thought to be so very wicked to rob birds' nests, or even to kill song birds for their pretty wings. Isn't that strange? But, in nearly every village in the land there was some wise, kind man or woman who knew these things to be not only very wicked but very foolish. If it had not been for these few, scattered bird-lovers, who protected the little feathered friends that sing to us so sweetly, and work for us so willingly, we would not have as many wild birds as we have today.

This is the story of one of these old-time bird-lovers and his bird-haunted garden. He was a country doctor. He lived in a village in the middle West, in a small white house with green shutters. In his large garden he had many beautiful trees, and the finest flowers and fruits and vegetables in the town, although he never seemed to take any more pains with them than his neighbors. People said he was lucky, or had the "knack" of growing things. But the wise doctor only smiled and said: "I have all my little feathered friends to help me." Few people understood just what he meant by that.

As the years went by, and wild birds became fewer, the doctor's garden was almost the only place in the town where many of them nested. Then people went to the doctor's house, to see and to hear the birds they had driven from their own door yards. The dearest treat the doctor kept for his little human friends, was to invite a few of them at a time to a sunrise concert on his vine-covered side porch. There, as still as little mice, they could listen to the bird songs, look through the doctor's big field-glass, and watch the happy singers at work or play. Now and then, the quietest child of all was allowed to peep into a big knot-hole in a fence post, and look at Mama Bluebird sitting on her eggs.

That is the way in which one little girl learned to know and to love our wild song birds. Don't you want to go into the doctor's garden, and watch the birds as they come north in the spring? You can learn to know them by their songs and colors, their nests and babies. You can learn how they helped their good friend grow flowers and fruits and vegetables. And you can learn how he made them understand that they were wanted, and would be protected. If you know all these things you, too, can have the wild song birds for summer visitors wherever you live. They will come to farms and into sheltered gardens of houses in large towns, and into the parks of the very largest cities.

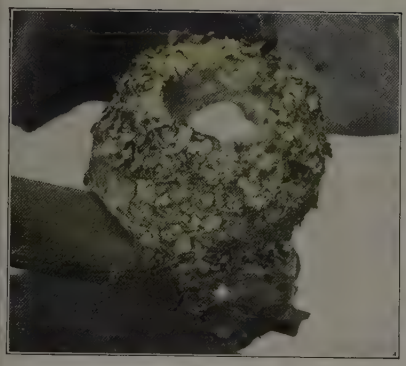
II. BIRD NESTS AND BABIES

One spring the doctor got all ready to put a new roof on the kitchen wing of the house. Mrs. Doctor said it leaked *ter*-ri-bly every time it rained. The carpenter came one Monday, early in April. But on the Saturday before, Mr. and Mrs. Jennie Wren had moved in under a broken shingle. They flew at that man. They told him just what they thought of him for trying to break up their housekeeping. The doctor laughed and told the man to go away, and not to come back until the wren babies were out of the nest.

A hat full of trash was taken out of that hole! There were twigs, grass, leaves, strings, rags and shavings, all laid loosely in a cup, and lined with feathers from the chicken yard. The wrens are fond of building, and any sort of a hole suits them. They will use an old shoe or a tin can. This pair built a second nest in the pocket of an old coat the doctor had hung up in a shed. If you nail some tin cans or cigar boxes up any where near the house, for nests, you can always have wrens living near you. In a wren's nest are laid as many as six flesh-colored eggs, spotted with tawny pink.

Of all the birds in the garden, the orioles made the finest nests, putting into them days of skilled labor. Orioles are weavers. The Baltimore oriole weaves a hanging purse of a nest, on the highest limb and the farthest twig of an elm tree. Sober little olive-and-yellow Mama Oriole is the artist. Gay orange-and-black Papa Oriole is merely the hod carrier. He gathers long blades of dry grass, strands of bark from grape vines and milk-weed, strings, wool, hair, thread and feathers. He has to find all these things, one at a time, and carry them up to the limb, that may be fifty feet in the air. Then he sits near his little mate and sings to her. He tells her how much he loves her, and how clever she is. He brags that no squirrel can run out to that nest, or cowbird lay an egg in it, or hawk get to the bottom of it. She works quietly and steadily, and sings her pretty alto with him, sweetly.

First she takes the longest, strongest bits and ties both ends to the twig. She ties hard knots, using her bill to pull the ends through tight. She does this until she has a number of loops, as deep as she wants the nest, for the warp, or up-and-down threads. Then she begins to weave in and out, taking a thread in her bill



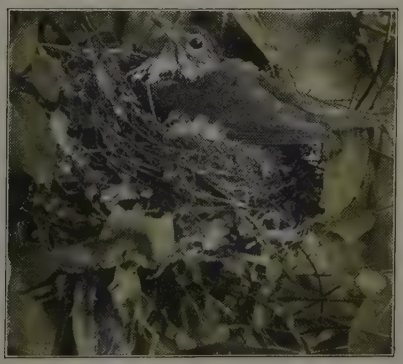
HUMMING BIRD'S NEST.

PHOEBE'S NEST BUILT ON A BEAM.

WORM-EATING WARBLER'S NEST.

BLUE JAY'S NEST

ROW'S NEST WITH YOUNG NEARLY READY TO FLY.



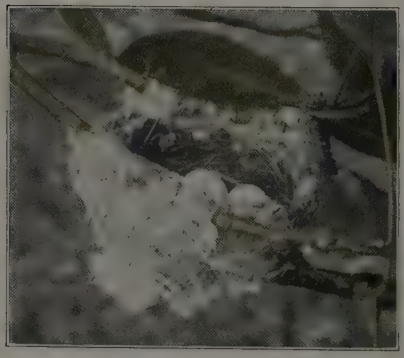
WOOD THRUSH ON NEST

VESPER SPARROW'S NEST.

NEST OF YELLOW-WINGED SPARROW.

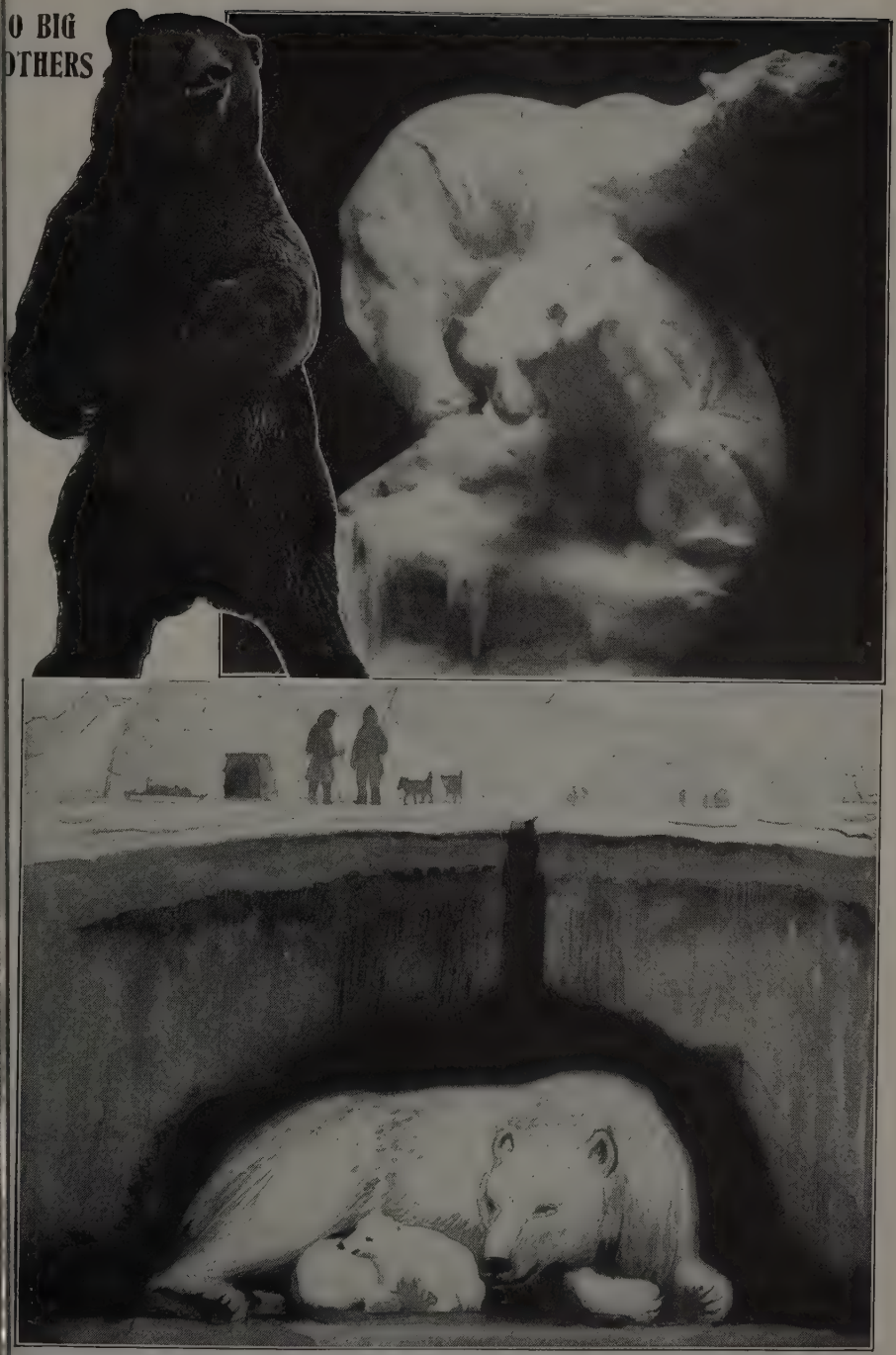
REED-WARBLER'S NEST BETWEEN THREE REED STEMS.

WOOD PEWEE'S NEST.



WARBLING VIREO'S NEST.

WHITE-EYED VIREO ON NEST.



Compare the big brown bear with the polar bears in Mr. F. G. R. Roth's statuary group. When winter comes mother polar bear lets the snow cover her and goes to sleep. Her breath opens a passage into the outer air. Toward spring her babies are born.

WILD ANIMALS YOU WOULD LIKE TO KNOW

EDITORS' NOTE TO MOTHER AND TEACHER.—Wild animals have a wonderful fascination for children. About the traits, habits and homes of those most commonly to be seen in menageries and city park zoos, they never tire of hearing. Ample accounts of these animals, giving the classifications and main facts by which they may be identified, are to be found under the appropriate headings in the body of this work. Those accounts should always be read first. The pictures should be studied, and drawings and clay models of the animals made. In no other way than by the graphic arts, can the facts of life be so firmly and accurately impressed on a child's mind. The child is then ready for peeps into the wonderland of the intimate life of wild creatures. Unconsciously, and with the keenest interest, he absorbs a great deal of geography, zoology and related subjects, and sees the animals in their relation to human beings, their place in literature and folklore, and their claim on his sympathy.

I. BIG BROTHER BEAR

W'y, wunst they wuz a Little Boy went out
In the woods, to shoot a Bear—an' he
Wuz goin' along—an' goin' along, you know,
An' purty soon he heerd somefin go "*Wooh!*"—
'ist that-a-way—"*Woo-ooh!*"

—*James Whitcomb Riley.*

You ought to get Mr. Riley's poems and read the bear story that little Alex, who couldn't talk plain, but who knew all about bears, " 'ist maked up his-own-se'f."

Did you ever think why little American boys and girls know more stories about bears, and are more interested in bears than they are in any other wild animals? It must be because white children and bears are such old acquaintances. They have always lived near neighbors, both in the old world and in the new. In northern countries, where white peopie live, there never have been any lions or other big, flesh-eating beasts, so Mr. Bear has had the woods and

III. HERE COME THE ELEPHANTS!

That is what the children shout when a circus parade marches through a town. The elephant is the children's delight. Draped in purple and gold he walks with the tread of an emperor before a conquered army. All the other wild beasts are in cages, but he, the largest and strongest of them all, a three-ton mountain of an animal, is led by his keeper as if he were a big, good-natured dog. And oh, if there is a baby elephant the children just about go crazy.

No wonder! Baby elephants are scarce. Even in her home on African plains, or in the East Indian jungle, a mother elephant has a baby only once in ten or fifteen years, so there are never more than a few babies at a time in a big herd of a hundred or more elephants. It's a great event when one is born in captivity. Such a baby! He weighs two hundred pounds at birth, is nearly three feet high and has a funny little trunk about as long as your twelve-inch ruler. And you never saw such a baby for growing! At the age of one year he weighs a half a ton. When he is hungry he squats in front of his mama, spreading his hind legs out behind him, pokes his head up between her *front* legs and sucks milk with his mouth, just like a calf. She pets him with her trunk while he nurses, and she doesn't wean him until he is two years old.

A baby elephant is as solemn as an Indian papoose. But in his own clumsy way he is very playful. He plays hide-and-seek between his mother's legs, and pulls her foolish little tail with his trunk. When anything alarms him, he gets right under her and shuffles along that way. And when she crosses a stream he climbs on her back until he learns to swim. In one thing he doesn't get over being a baby until he is a grandfather. He spends half his life cutting new teeth. An elephant has twenty-four grinding teeth in all, but he cuts and uses only four at a time. As one set wears down a new set appears just behind. Maybe it is cutting teeth that makes a big, fifty-year-old elephant peevish, sometimes.

There is a secret that a very young baby elephant can tell you that even his mama doesn't know. Ages ago there were elephants and mammoths and mastodons that were much like them, only twice as big as any elephant living today. They lived all over Europe and America, some of them away up in the coldest countries where

Elephants at Work

The Elephant has a big brain as well as a big body, and he uses it. Notice how the one on your right kneels and seizes that peg because he can't get his trunk under the beam as his partner is doing.

GOOD TEAM WORK

We are piling teakwood beams in Rangoon, India—my partner and I.

I pick up a little one like this all by myself, stand it on end against the pile, then lift it on my tusks and slide it into place—so:

EMPERORS OF INDIA

Elephants passing reviewing stand at the Durbar—the great ceremony at which England's king is declared Emperor of India.

"Draped in purple and gold, he walks with the tread of an Emperor before a conquered army."

This is the way I use my foot to crack a cocoanut or roll a log.

And this is how I roll great big logs in the forest.

ANOTHER WAY OF MOVING BEAMS

This is how we push beams along the ground with our tusks. My partner is letting me be the whole show while you are watching us.

GOOD HEALTH

EDITORS' NOTE TO MOTHER AND TEACHER.—Do you remember the first time you opened the old-fashioned text-book on "Anatomy, Physiology and Hygiene?" It began by enumerating the two hundred and eight bones of the human body, and showed them all in a cheerful picture of a skeleton. A year's study left you with a dazed sense of how fearfully and wonderfully you were made. But much of the knowledge was unpleasant and seemed of no practical use. The "Hygiene," or instructions on how to keep the body in health, was vague as to detail and was given little space in the back of the book next the index. Wasn't this absurd?

Nowadays, in all lines of education, we are letting the horse pull the cart. In the very first year of school, in simple, good health talks, little children are told how to take care of the dear, rosy bodies they live in, so they can enjoy playing and working, eating and sleeping, and grow up into fine, strong men and women. Good health, you see, is a habit, and habits must be caught young. Little tots can understand why they should stand and sit straight, to give lung-bellows and engine-heart room; why they should breathe pure air, deep, and sleep with the window open; why they should bathe often, and keep the teeth clean, and not read by dim light, or sit with wet feet and clothing. They can understand why they should eat a variety of food, slowly, and not overload the stomach, or never give the little food-mill a rest.

Regard for personal health leads naturally into regard for the family and public health, and those are domestic sanitation, sociology and civics. Big words and big ideas for little folks, you think. But are they? We are all bound together. None of us can live alone, or be unaffected by the people and conditions around us. Any little child who "catches" the measles can understand the need of quarantine. Domestic sanitation is just good health housekeeping, and practical civics for most of us is just good public housekeeping. The health, street-cleaning, police and fire departments exist to protect the health, lives and property of all the people. They all come very close to our daily lives and concern us all. We can help in this public housekeeping, take a part in the government. If we fail to do so, are selfish, indifferent or lazy, we must suffer for it.

It is astonishing how very early little children can be made to understand these things, and be brought into active relation with government; with a sense of duty toward the general public, and respect for the blessings of health, law and order in the community. In some large cities, school children are organized into brigades to help the officers keep clean alleys, and clear fire escapes. Little soldiers of peace they are, serving their country as patriotically as heroes of war. The schools understand now that children need education and experience in intelligent citizenship, as much as in arithmetic.

GOOD HEALTH

I. YOUR OWN HEALTH

You live in a little house all by yourself. You were born in it. You will have to live in it all your life. It is your body. People who own houses are proud of them. They take care of them, and try to live in them just as comfortably as they can. The first thing necessary to live comfortably anywhere, is to keep everything sweet and clean and in order.

Your body has a framework of bones, as a house has of timbers. The muscles cover these bones as weather boards, lath and plaster cover the timbers. The skin is a sort of coat of paint to protect the house from the weather. Your body has a heart, that is a little heating and pumping plant. It has all the tools in it for preparing food for use in the body. It has lungs for ventilating with fresh air. It has sewer pipes for getting rid of waste, and it has a network of little nerve wires to give warning of trouble, inside and out. It has windows to see through, and a telephone in the ear.

It is much better to use a house than to let it stand idle. Things rust out quicker than they wear out. So it is with your body. You must use every bit of it, every day, and live in every corner of it. The bones and muscles become weak and stiff if they get no exercise. Working muscles and bones call for more blood. This compels the heart to beat faster and stronger, and the lungs to call for more air to keep the blood purified. All parts of the body should be exercised equally. Swimming, rowing, skating, bicycle riding, dancing, and just plain walking in the fresh air, are splendid exercises. Games, like base-ball, foot-ball, basket-ball and tennis are fine, too. They train both mind and body to think and act quickly. Sweeping a room, hoeing a garden and splitting kindling for mother, are good for the body, too. Laziness is rust for body and mind as well as for the hinges of a door. Don't do anything half-way. Study hard, get your lesson and quit studying. Play hard and then rest.

Babies—How to Care for Them

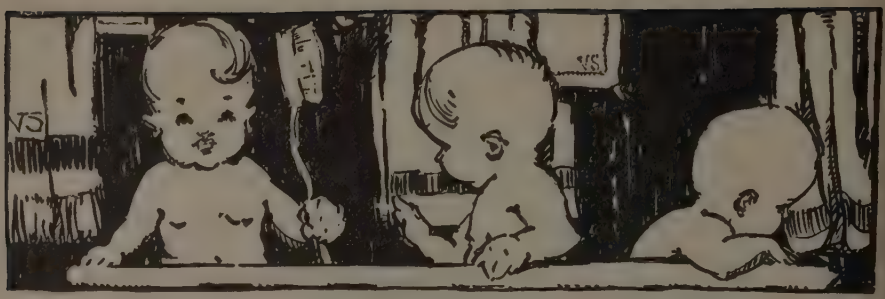
This is an article not only for mother, but for "big sister" also, even though she be but twelve years of age.

When "little brother" or "little sister" comes into our home, it is very tender and helpless, and wishes to do only one thing: grow. And as we know more about baby, and what we may do to assist it in growing, the happier will be our home.

Let us consider first the feeding. One of the most important factors is regularity. Do not feed a baby just because it cries. Regularity in feeding is necessary for the proper growth, health and contentment of the infant. Pacifiers are not recommended, for they are likely to cause the baby to overwork and enlarge its throat muscles. During the first day of birth the infant should have only one to two teaspoonfuls of water, and the first nursing may be given four hours after birth, and repeated every four hours, for five to ten minutes. The infant should be removed several times during the feeding, to permit it to expel gas; gentle patting on the back may assist it in the process. A recommended schedule for babies under five months is: feed, 7 to 7:30; sleep, 7:30 to 9:30; bath, 9:30 to 10:00; sleep, 10:30 to 1:00; feed, 1:00 to 1:30; sleep, 1:30 to 3:30; awake, 3:30 to 6:00; feed, 6:00 to 6:30; sleep, 6:30 to 10:30; feed, 10:30 to 11:00; sleep, 11:00 to 7:00. The whole series of time may be set forward or backward a little, to accommodate individual home habits.

The feeding schedule changes as baby advances from five months to a year. Here is a standard table. In its application, bear in mind that individual cases vary, and doctor's orders are to be obtained and followed: nurse, 6:00; between 6:00 and 10:00 one to two tablespoonfull strained orange juice, diluted at first; 10:00 cereas paste, one-half to three level tablespoonfuls, then nurse; 2:00, beef juice, one to one and one-half tablespoonfuls, dilute at first, start giving one-half teaspoonful of vegetable, strained (at eleven months one tablespoonful each of two vegetables, cooked one-half hour, as peas, spinach, potatoes, carrots), and nurse; 6:00 nurse after food (at ten months baby is given as much as three level tablespoonfuls of cereal at this time); 10:00, nurse (may discontinue at eleven months).

In general comment the following facts are of importance: nurse after, not before, giving other foods; absolute cleanliness of bottles and containers is imperative; never give milk from cows eating ensilage; if the baby is in the city, feed certified milk if infant is not nursing; a baby may be overfed as well as underfed; after the first few months, and continuing during all growing child development, the drinking of milk, and eating of cereals are essential factors in the building of the body; fruits should be eaten fresh or dried, and vegetables should be cooked one-half hour or less, for canning or excessive cooking is likely to destroy the vitamines necessary to proper health and growth. New canning methods are coming in vogue by which heat is not applied for a sufficient time to destroy the value of the vitamines, but dried fruit is especially good.



The general causes of colic are: too rapid and over feeding, or the excessive use of cathartics.

Vomiting generally indicates that there is too much fat in the food mixture.

Diarrhea may be caused by too much sugar, or milk too rich, and indicates that baby is not receiving a proper food mixture.

Constipation, in general, is caused by boiled milk, abuse of cathartics, too much fat in food mixture, lack of fruit juice, and insufficient water.

The following height and weight development chart is for the average boy. Girls will agree with it, approximately, at birth; by the end of the first year there is a variance of one-half inch and one-half pound less. If the child weighs twenty per cent. over the figures it should be examined, as excessive over-weight, as well as under-weight, may indicate general debility. At birth, 20.6 in., 7.55 lb; two months, 22.5 in., 10.4 lb; four months, 24.5 in., 13.2 lb.; six months, 26.5 in., 16 lb.; ten months; 28.5 in., 19.3 lb.; one year, 29.5 in., 21 lb.; one and one-half years, 32 in., 24.5 lb.; two years, 34 in., 27.3 lb.; two and one-half years, 36 in.; 30 lb.; three years, 37.5 in., 32.5 lb.

An infant should be bathed once each day, testing temperature of the water with the back of the hand, or, better yet, the elbow. The temperature should be about 100 degrees F. at first, and, as the weeks go by, permit the water to cool to about 98 degrees F., and then 95 degrees F. Wash the face while the body is covered, and always support the back of the baby with your left, or right arm. Nostrils and outside of ears are cleaned with match or toothpick wrapped with cotton. Never attempt to clean the interior of a baby's ears. Do not rub with a towel, but pat the skin until dry.

Holding, rocking, fondling, and teasing will make baby cross. Let it go to sleep without rocking. The more one handles baby the more nervous it becomes, and the less it grows. If one begins to pat and rock baby unnecessarily, it will form the habit of crying to be held, to its own detriment.

Baby begins to cut its teeth at about the seventh month, the central incisors appearing first. It attempts to sit up at about the sixteenth week, and is able to do so at about the fortieth week. It walks at about the fourteenth or fifteenth month.

The Binet-Simon mental test gives many suggestions regarding the mental development of children. In part, the following is presented as proper development of a normal child. At the age of eighteen months, a baby generally can say "mamma," "papa," and a very few simple words. At the beginning of the third year it will pick out objects in pictures and repeat short sentences. At four years it distinguishes sex and between long and short time. At five years it can repeat sentences of eight or ten words; and at six it can distinguish between morning and afternoon, and carry out commands involving two or three things.

See Food, Health and Growth, by Emmett Holt; *First Aid in Nursing Ailments*, by E L. Coolidge; *Nutrition and Growth in Children*, by William R. P. Emerson; *Care and Feeding of Infants and Children*, by Walter Reeve Ramsey; *Feeding, Diet and General Care of Children*, by Albert J. Ball.

How and Why of Common Things

Why a Dog Turns Around Before Lying Down
Why the Needle in the Compass Points North
What Keeps a Moving Car on the Track?
How the Days Were Named
What Is Smoke?
How the Spectrum Explains the Sun
Why Does Heat Make Water Boil?
Why We Count by Tens
Alva and His Electric Lamp
Why Some People Are Left-Handed
Why Onions Make You Cry
What Rings the Door Bell?
Why the Earth is Round
Why People Become Seasick
How a Photograph Is Taken
What Are "Dog Days?"
Thumb Print Autographs
How Does Cloth, Paper or a Sponge Soak Up and Hold Water?
How Bears Live All Winter Without Eating
Live Silver—What Is It?
Are the Stars Inhabited?
Doggie Knows with His Nose
Why Lightning Rods Protect Houses
Why Salt Causes Thirst
Is There a Man in the Moon?
Why an Apple Falls to the Ground
Why Washington's Eyes Follow Us Day and Night
Children, Birds and Teakettles
Sound Waves and the Phonograph
Don't Put Boiling Water in a Cold Glass
What Makes a Mirage?
Why Birds Moult
Why an Iron Ship Does Not Sink
What Makes the Music in a Pipe Organ?
Thunder and Lightning

Why Is the Water of the Ocean Salt?
Why We Are Tanned by the Sun
Sound Waves and the Telephone
Why a Pop-Gun Pops

Why We Have Two Eyes
What Makes the Sky Look Blue?
How Steam Makes a Locomotive Go
What Are Tears For?

Water and a Duck's Back
How Does Soap Make Things Clean?
How Trains Run Around Curves
The Ages of Animals

What Is "Horse Power?"
Why the Sky Is Many-Colored at Sunset
How the Moon Causes Tides in the Sea
What Is the Horizon?

Where the Date Changes
Why the Edges of Coins Are "Milled"
How to Find Your Way by the Stars
Why Does Iron Rust?

Sources and Kinds of Oil
How the Months Were Named
How Quickly Do Things Fall?
Fairy Prince Echo

What Is Color Blindness?
Why Frozen Water Bursts Pipes
What Keeps a Bicycle Upright?
What Sours Milk?

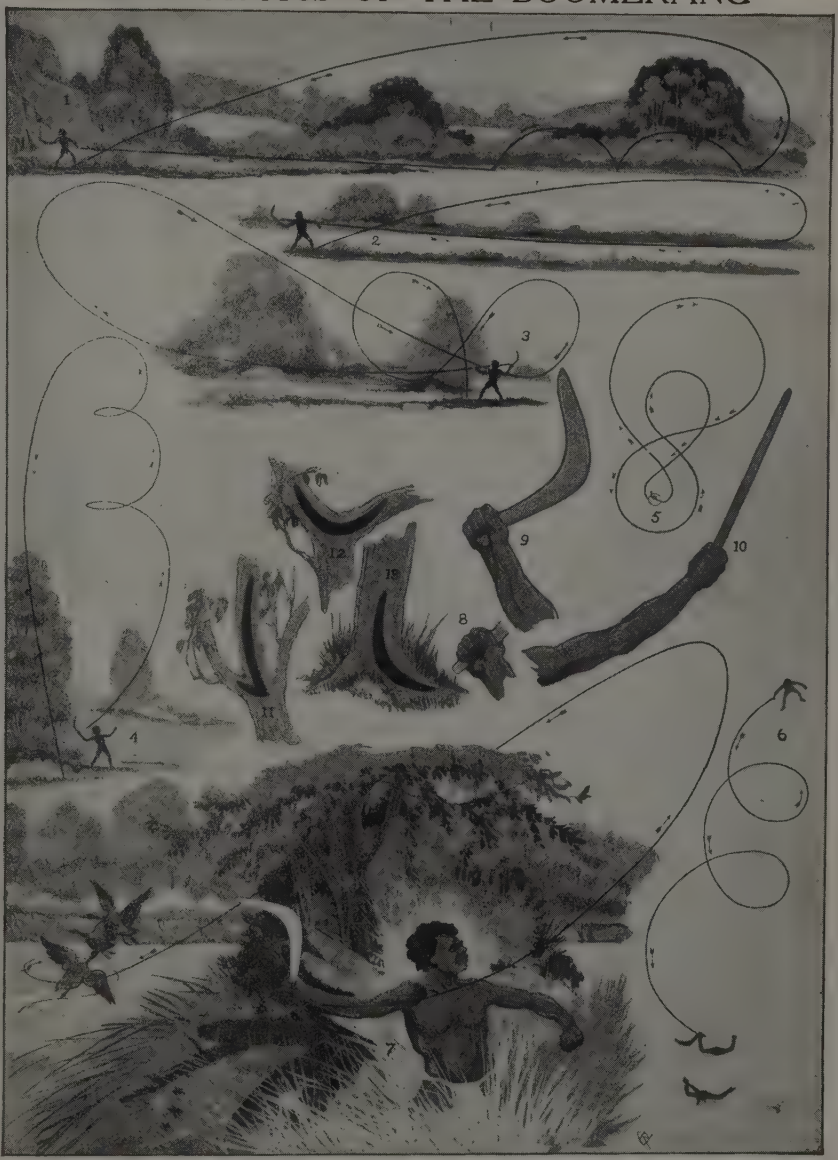
Why Rain Falls in Drops
Why Is a Cat Able to See in the Dark?
A World of Wonders in a Soap Bubble
The Gas We Burn

Why and How We Sleep
Birds and Balloons, Kites and Air Ships
What Makes an Automobile Go?
What Makes the Hum of a Bee?
What Is an Eclipse?

YOU CAN LEARN TO BLOW BUBBLES LIKE THESE

th a pipe, a straw and two rings, you can, with a little practice, blow all the bubbles you see here. You enclose the flower in the bubble by using the funnel as you would a pipe. One bubble is made inside another, and a third inside of that by blowing the first bubble, piercing it with the straw and then blowing the other bubble inside of it.

GYMNASTICS OF THE BOOMERANG



The Australian bushman can make his boomerang do all these things. In No. 1, he shoots it ahead of him so that it strikes the ground, makes two loops and then one grand loop through the air back to his feet. In No. 2, it sails through the air and comes back again without touching the ground. In Nos. 3, 4, and 5, it is executing various other air maneuvers more complicated than those of the bird-man. No. 6 shows how a boomerang with a hook at the end can be made to catch on the shield of an opposing warrior and hop right over at him. In No. 7, the bushman concealed from view, is "shooting" a duck. Figures 11, 12, and 13 show how boomerangs of different shapes are cut out of trees.

thing like leather. Do you see why brown and black people are natives of hot countries where there is much sunshine, while the fairest nations of the white race live in cold, northern countries where there is the least sunlight?

WHY AND HOW WE GO TO SLEEP

"Why do we go to sleep?" That is what the little "why" boy asked his mama.

"Because we are sleepy."

"Why do we get sleepy?"

"Because we are tired."

"But why do we get tired?"

"Oh, dear!" The little boy's mama said she never knew such a tiresome child for asking questions. He made her so tired she was sleepy. Now what had happened to her?

We all have two kinds of nerves. One kind makes us feel, see, hear, touch and taste. Their tiny, sensitive ends come to the surface all over us, and telegraph sensations to the brain. The brain telegraphs to the nerves of motion to make the body do things. When they are used all day long, these sensation and motor nerves get tired of sending messages. The brain gets tired of receiving them and sending orders. The muscles and bones of the body get tired of carrying out these orders.

You see, everything is made tired, or worn out by use—just as your shoes are. You have to throw a pair of tired-out shoes away. You cannot do that with your body. But it will make itself as good as new, if you give it a rest every so often. In sleep the wearing out is stopped. The nerves and brain—which is a big bundle of nerves, a switch-board for "central"—the muscles and bones all stop working The heart, lungs, stomach, and all food-making organs, go right on working, although not as rapidly as when we are awake. The fires of life burn low. So the day's waste is made up, and we awake rested.

While grown people rest when asleep, children both rest and do most of their growing. Children need more sleep than grown people. Children who have too little sleep are apt to be small and weak, and not as bright in their minds as they might be. But *how* do we go to sleep?

By shutting all the little doors to the brain. Nature begins it. At the end of a day, we do not feel, hear or see as keenly as when we

are fresh in the morning. The nerves do not carry messages as rapidly, nor the brain or body act as quickly. Then *we* help nature. We undress and lie down in the dark. We protect all the little surface nerves from sensations—try to give them no messages to carry. We shut our eyes for the same reason, and we make the house quiet to keep sounds from knocking at our ears. With no "ringing up" on the switch-board, much of the blood leaves the brain. The heart and lungs slow down, the stomach will not need food-fuel for twelve hours or more. So we go to sleep. Now some little "why" boy is sure to ask;

"*Where* do we go when we go to sleep?"

We don't go anywhere. When we dream we go to places, it is because the outside world isn't quite shut out, or an overloaded stomach telegraphs trouble to the brain. We aren't as fast asleep as we should be when we dream. The best kind of sleep is when we are all there and don't know it.

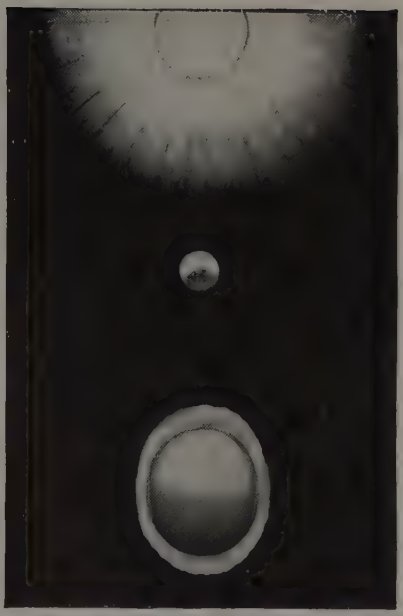
THE AGES OF ANIMALS

No one knows exactly how long animals live in a wild state, but records have been kept of animals that have been tamed by men. And scientists are able to come very close to the ages of wild animals by examining the teeth, bones and other parts of the body. Turtles, toads, crocodiles and many reptiles, all cold-blooded animals, are long-lived. Cold-blooded animals as a rule are sluggish in their movements, so you see there seems to be a relation between how fast things move and how long they live. With a few exceptions, another principle seems to be that the largest animals live the longest. An elephant, for example, may live to be 150 years old. The same rule seems to apply in the plant world. Grass which is so frail is the creature of a season. Trees live much longer and the big trees of California were hundreds, yes, thousands of years old, when Columbus discovered America. Domesticated animals are shorter-lived than their wild relatives. A dog is old at 12 and dies at 15. A few have been known to live, blind and feeble, until 20. But here again is an exception for a cat's "nine lives," all put together, may reach (as you see by our picture talk) to 40 years, yet pussy's big cousin, the lion, has never been known to live longer than 35 years. Insects—how lucky for us!—are short-lived because they are very small and many of them very active. As Mr. Dooley said of the mosquito, " 'Tis a short life and a merry wan!"

LENGTH OF LIFE AMONG ANIMALS

One of the most interesting things in the study of animals is the length of life of which they are capable. A May fly, for example, born at 1 o'clock, is approaching old age by 4, and by 5 has passed away; while a whale who saw Columbus discover America might still have been spouting until near the end of the 20th Century. Insects, fortunately, are short lived; otherwise, life would be pretty hard for all the rest of us. But other small creatures, you notice, are quite long lived. A saucy little sparrow, for instance—if nothing happens to him—could keep chattering at you off and on from the time you learned your first baby words until you reached middle age.

This picture shows how the moon attracts or pulls toward itself the water on the side of the earth nearest it, causing a high tide. It also draws the earth away from the water on the other side, leaving a high tide there.



In this picture the moon and the sun being on the same side of the earth, both pulling the same way, a very high tide is caused, called spring tide.

When the moon is on one side of the earth and the sun on another, as shown here, each pulling toward itself, the attraction of the moon is weakened and the tides are not so strong. These lesser tides are called neap tides.

THE BOY SCOUTS

I believe the treatment you have accorded the subject will be both interesting and instructive. It should prove readable and understandable to all classes and ages of readers.

Geo. W. Smith

SECRETARY EDITORIAL BOARD, BOY SCOUTS OF AMERICA.

"Scout" used to mean the one on watch for the rest. We have made the scout an expert in Life-craft as well as Wood-craft, for he is trained in the things of the heart as well as head and hand. Scouting we have made to cover riding, swimming, tramping, trailing, photography, first aid, camping, handicraft, loyalty, obedience, courtesy, thrift, courage and kindness. Whether you be farm boy or shoe clerk, newsboy or millionaire's son, your place is in our ranks.

Ernest Thompson Seton

CHIEF SCOUT

A few years ago a committee of boys canvassed a city neighborhood to raise a small sum of money to be used in fitting up a club room. The first man they approached was a merchant who had been born on a pioneer farm. When the boys explained that they needed a gymnasium for their physical development, and a room for quiet games and reading in the evenings, the old man glared at them.

"Need exercise, do you? Go and saw wood for your mother."

Those twentieth century boys laughed. They lived in tiny cottages on twenty-foot lots, or in small flats in big tenement buildings. Not one of them had ever seen a stick of wood to burn, nor a garden to hoe and weed, nor a cow to milk.

"Then get a job in a store. I was sweeping out a country store and building the fires when I was twelve years old."

The movement has now spread over all the world and has enrolled hundreds of thousands of boys. But it is most active in America and England and all the English-speaking colonies. There are several hundred thousand members led by many thousand Scout Masters. Most of the National departments, many of the states and all of the big public movements are actively co-operating with the Scout movement.

WHAT THE BOY SCOUT MOVEMENT MEANS.

The impression that many people have, that the real purpose of the Boy Scout movement is to train future soldiers, is wrong. It is intended first to give the boy, deprived by modern industry of his ancient rights, a square deal, to fill his vacant or mischievously employed hours with healthy, absorbing interests; to give him a better developed body, more acute senses, a more alert and resourceful mind, and to help him grow up into a more useful, responsible man and patriotic citizen. No guns, swords, gauntlets, whips, spurs or any purely military equipment are allowed, and no military drilling is prescribed. Target shooting with a bow and arrow, that a boy may make for himself, is encouraged. But he stalks game only with an opera glass, and takes shots only with the photographic camera. Honors are for feats of skill, results of serious study and deeds of humanity. They are to be won only by courage, industry, strength and honesty. Every badge stands for clean living and sustained effort.

HOW TO BECOME A BOY SCOUT.

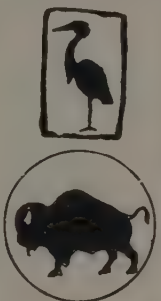
With the boy who reads this the first question would naturally be: "How can I become a Boy Scout?" There is no difficulty about it, for it is desired to enlist as many boys as possible. Information and practical help are freely given, on request in person or by letter, at the National Headquarters, which are located in New York City. There are Scout Councils in all the large cities in the country, and in many populous towns and counties; and local committees are being established in villages and city districts. The official handbook of The Boy Scouts of America is to be found or ordered in any bookstore, and is on the shelves of most public libraries. Any boy, anywhere, who is between the ages of twelve and eighteen, can easily learn how to get into touch with the nearest local Scout Council, and how to join, or even to form a new patrol. But usually a new patrol is

THINGS THE BOY SCOUTS DO

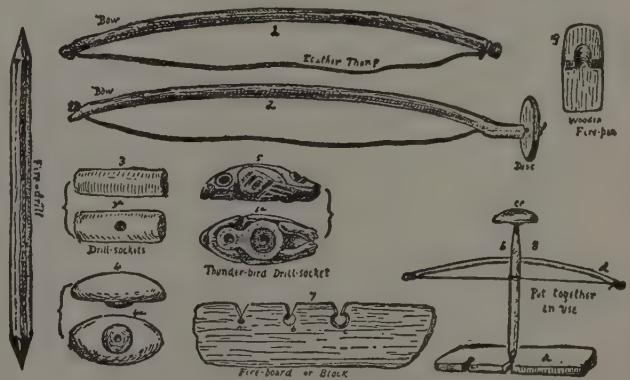
How Boy Scouts study tracks: Tree bird and bird living partly on ground. Which is which?

Ernest Thompson-Seton, General Baden Powell and Dan Beard, Scout "Fathers."

Position of right hand in taking the oath



Patrol badges. The upper is the badge of the "Blue Herons," the lower of the "Blue Buffaloes."



Drawn by Ernest Thompson-Seton.

HOW TO BUILD A FIRE WITH RUBBING STICKS.

Boy Scouts make a fire with rubbing-sticks in from five to ten minutes. Pass leather thong taut around drill; put lower point of drill in pit at top of notch in fire-board and hold socket with left hand. Fire-board notch should rest on a chip or thin wooden tray (9). Hold bow by handle end in right hand, steady board under left foot and left arm against left knee. Draw bow back and forward, full length, with steady. even strokes. Ground-up wood will run out of side of notch, falling on tray. At first it is brown, in two or three

Illustrations Copyrighted by Boy Scouts of America.

seconds black, and in five or six seconds gives off cloud of smoke. Then fan gently with hand and in a few seconds you will see a glowing coal in the middle of dust. Take about a teaspoonful of shredded cedar wood, previously prepared, wrap it in bark fiber or shredded rope, hold it on coal, and lifting tray and all, blow it until it blazes. Carefully add birch bark shreds or pine splinters, and your fire is made!

Figure 1 is a simple bow—a bent stick, about 27 inches long and 5/8 inch thick, with stout leather thong. In No. 2 thong at handle end goes through disc of wood to tighten by hand pressure against disc while using. Figs. 3 and 4a show drill sockets. No. 5 is a fancy one. Here (4-4a) is a soapstone socket let into wood and fastened with pine gum. Top of drill should be greased before using. It should be 12 to 18 in. long and about 3/4 in. thick, roughly eight-sided so thong will not slip. Best drill wood is old, dry brash, but basswood, white or red cedar, tamarack, and sometimes even white pine, will do.

MERIT BADGES AND HOW THEY ARE WON.

To win a Merit Badge a Scout must show that he knows certain things and that he can apply his knowledge. To win an electricity badge, the first shown on left, he must, among other things, illustrate, by experiment, the laws of electrical attraction and repulsion and name three uses of direct and tell how it differs from alternating current.

MACHINERY BADGE: State principles underlying use and construction of lathe, steam boiler and engine, drill press and planer.

MINING: Know and name fifty minerals; define watershed, delta, drift, fault, glacier, terrace, stratum and dip.

ORNITHOLOGY: Identify by appearance or note forty-five different kinds of birds in one day and make a good clear photograph of some wild bird.

PHOTOGRAPHY: Understand theory and use of lenses, construction of camera, and action of developers; make a recognizable photograph of any wild bird larger than a robin, while on its nest; or a wild animal in its haunts; or a fish in water.

PUBLIC HEALTH: Draw diagram showing how flies carry disease; how to co-operat with the Board of Health in preventing disease; describe garbage disposal.

PERSONAL HEALTH: Describe care of teeth, proper eating and effect of alcohol and tobacco on growing boys.

AVIATION: Know theory of aeroplanes, balloons and dirigibles; describe various types of aeroplanes and their records.

AGRICULTURE: Identify injurious insects and tell how best to handle them; have a general knowledge of farm work and of dry farming and irrigation.

CIVICS: Know how president, vice-president, senators and congressmen are elected, the various departments of government as represented in the president's cabinet.

CHIVALRY

By Dr. Frank Crane

ALL of us want to be loved, to be honored and to be respected. And chivalry is that thing in us which is surest to win love, honor and respect.

Chivalry is nobleness of mind. The opposite to chivalry is meanness and pettiness.

Chivalry is thoughtfulness of others. Its opposite is egotism or vanity.

Chivalry means what is expressed in the Latin motto, "suaviter in modo, fortiter in re," which is, gentle in manner and strong in act.

In this we find the difference between a gentleman and a savage. The gentleman can strike just as hard and fight just as bravely as the savage, but he is not cruel, and he takes no unfair advantage.

The chivalrous man is always respectful and considerate toward women. The chivalrous woman never takes advantage of her own weakness.

All chivalrous persons are considerate and kind toward those who are weaker or poorer than themselves. For anyone to boast and to thrust himself forward is a sign of vulgarity.

The chivalrous man is always courteous. He avoids rudeness and loudness. The woman who is chivalrous never indulges in display, she controls her temper, she speaks in a low voice, and does all she can to put at ease all those around her.

The perfect gentleman or lady is the one who makes the most people happy.

It is a great temptation to say sharp and biting things, but to do this is proof that we are lacking in good breeding.

It would be very much worth while for every young person to make it a settled rule never to say anything that can hurt another one's feelings unless it is absolutely necessary.

And this rule ought to hold also in regard to people who are absent. If we make it a settled principle to say nothing about an absent person that we would not say in his presence, it will save us a good many heartaches.

The chivalrous person pays attention to good manners. Good manners simply means a proper regard for others, and a constant desire to act so as to be pleasing.

The best way to learn good manners is to associate as much as possible with good-mannered people, and to imitate them.

The vital thing in chivalry is humility. Real humility does not consist in excusing ourselves and always apologizing. It consists in real gentleness of spirit, in not thinking of ourselves so much as we think of others, in willingness to learn and in realizing that no matter how much we know, there is a great deal more to be known.

False humility is very unpleasing. It makes us feel that the one who shows it is not really humble, but is merely putting it on for a purpose. But real humility will show in our every act, and will make us kind and helpful and agreeable to all with whom we come in contact.

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HOW AND WHY OF ETIQUETTE

RULES THAT GOVERN THE DRESS AND MANNERS OF PEOPLE OF GOOD BREEDING AND THE CUSTOMS IT IS SO EMBARRASSING NOT TO KNOW.

"Teaching manners and morals is plainly one of the most important parts of education."—DR. CHARLES W. ELIOT, PRESIDENT EMERITUS OF HARVARD.

THE PRINCIPLES OF GOOD MANNERS.

"Good morning."

That's the way to begin each day in society—with a pleasant greeting. And you are "in society" as soon as you are outside your bedroom door. Did you ever think of that? You will never find better company, anywhere in the world, than in your own family, so don't save your best manners for strangers. They won't wear out by using them. On the contrary, good manners are a habit. If they are not begun at home and constantly practiced there, you may forget to put them on when strangers are about. As you go through life you will want to make friends of the very nicest people you meet. But if you are boorish in your manners, well-bred strangers will not care to know you.

"But there are so many rules it is hard to remember all of them," you say.

There aren't so many, really. It's like Arithmetic—a few rules and a great many examples. One of them has been put into a rhyme that you should commit to memory:

"Politeness is to do and say
The kindest thing in the kindest way."

Think how many acts that one rule should inspire. Your very first thought should be to care for other people's feelings. Next, you should be self-forgetful, self-possessed and self-respecting. Third, be natural. A selfish person may know all the customs of good society, but he never can be perfectly well-bred. A self-conscious person is

Good Times at the Table

A child should always say what's true,
And speak when he is spoken to,
And behave mannerly at table;
At least as far as he is able.
—ROBERT LOUIS STEVENSON.

You Can Have the Best Times Where There is the Most Good Breeding —How to Sit—What to Do and What Not to Do with Your Napkin—Knife and Fork Etiquette—How Bread Should Be Eaten—The Soup and the Spoon—About Second Helpings and Good Appetites—Table Talk—The Neighbor's Children at Meal Time.

The first social affair of the day is breakfast. Well-bred people are strict about table manners. All your life you will sit at table with other people three times a day. Think how many chances that is in a year to make yourself agreeable. If your table manners are offensive, your family may overlook the matter, or endure your boorishness in silence, but well-bred acquaintances will never ask you to eat a meal with them. And you should know that an invitation to dinner is the very highest social honor one person can pay another.

Six Things to Do and Sixteen Not to Do at Table

Sit upright at the table. Do not slide down on your spine, nor sprawl forward on your elbows. Unfold a small breakfast or lunch napkin to its full width, a large dinner napkin to half its width, and lay it across your lap. Don't tuck it in your neckband or button-hole. A baby needs a bib, but a child should learn early to eat without spilling food. Keep your hands in your lap until you are served. Don't fidget with your knife and fork, drum with your fingers, kick a chair or table leg, or tap your foot on the floor. These are nervous habits that annoy other people. Learn by watching older people how to hold your knife and fork properly. Don't make a noise in eating and drinking, take enormous bites or chew with your mouth open. To eat fast looks greedy

"AND BE MANNERLY AT TABLE"

TWO RIGHT WAYS AND ONE WRONG WAY

THREE WRONG WAYS OF EATING

ONE RIGHT THING AND TWO WRONG THINGS TO DO AT TABLE

Etiquette of the Invitation

Wedding Invitations and Announcements—The Reception—Invitations to a Debut—For a Private Dance—Dinner Invitations—Ladies' Luncheons—Garden Parties—Wedding Anniversaries—Complimentary Cards

Invitations to all formal entertainments should be printed from engraved plates. For weddings and other large affairs of ceremony, the wording is in the third person. The wedding invitation and announcement are on heavy cream-laid note paper that folds once, is enclosed in an inner and outer envelope, and is usually sent by mail. The lettering is in script or in old English or German text, whatever is the fashion of the moment. The following is the proper arrangement:

Mr. and Mrs. George W. Wilson
request the honour of your presence
at the marriage of their daughter
Ina
to
Mr. Nelson S. Moore
on Saturday evening, the seventeenth of September
One thousand nine hundred and ten
at half after seven o'clock
Congregational Church
Morton Park, Ill.

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(FIFTY SEVEN PAGES)

THE STUDENT'S is the only general reference work that has ever attempted to cover the important subject of "Manners." Nowhere has it been presented in such practical form. There are 57 pages on this subject covering, among others, the following topics:

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ON THE STREET

Rules About Bowing and Lifting the Hat—When One Should Bow to Strangers—When One Should Offer One's Arm to a Lady—Getting On and Off a Street Car—"Dos and Don'ts" Governing Conduct Inside the Car.

FOR A GIRL TRAVELLING ALONE

The Question of Dress and the Wearing of Jewelry—What Courtesies May be Accepted from Fellow Travelers—In the Pullman—At the Hotel—Ordering One's Dinner—When Reading at Table is Allowable—The Waiter and His Duties.

SOCIAL LIFE FOR CHILDREN

Some Things a Child Should Not Be Allowed to Do—Entertaining Little Visitors—When Visitors are Impolite—The Child's Correspondence—Conduct of a Child's Party—Form of the Invitation—Place of the Older Person.

YOUNG MEN AND WOMEN IN SOCIETY

When Debuts are Usually Made—Dress of the Debutante—Her Mother's Dress—How Long Callers Should Stay—The Table and its Color Scheme—The Refreshments and Who Should be Invited—Reasons for the Chaperon—The Young Man's Social Duties—What He May Do and What He May Not Do.

ENGAGEMENTS AND WEDDINGS

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WOMAN'S WORK as the center of all family life is necessarily so broad that almost every feature of THE STUDENT'S has its bearing upon her life or the future of her husband or her children. In planning THE STUDENT'S however, we have been careful to cover also her own special interests as home maker and worker for the common good.

Articles on the Education of Children 40
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Ceramics	Mosaic	Terra Cotta	Fire Proofing
Chinaware	Plating	Rugs	Plastering
Gem	Porcelain	Etching	Health
Glass	Tapestry	Silver	Adulteration of Food

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Revised by MRS. MARY I. WOOD Manager Information Bureau, General Federation of Women's Clubs and Associate Editor Women's Club Department, STUDENT'S CORRESPONDENCE BUREAU.

No better illustration of the direct application of the information in the Student's to the work of the Women's Clubs could be given than the following list of subjects taken at random from Women's Club programs from various parts of the country:

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What Other Women's Clubs are Doing.
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Our Work for Social Hygiene.
The Child and Child Labor.
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Art and the Public School.
Dangers Arising from Impure Milk Supply.
Florence in the Fifteenth Century.
Practical Plans for Civic Work.
The Establishment of Public Baths.
The Peace Movement.
Promotion of Civil Service.
School Extension Work.
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Garden and Orchard: In addition to the articles listed under Agriculture are articles on Flowers, Fruits, Plants, Trees, etc..... 151

The completeness of the work on other topics may be judged from the following examples of the number of Articles or Cross References on subjects named:
United States History: Indians 67, New England 10, Revolutionary War 17, United States 73.
Ancient, Medieval and Modern History: Athens 14, Carthage 17, Crusades 9, Egypt 25, Greece 44, Persia 24, Roman Empire 32, Treaties 15, Turkey 18, Crimean War 12, Napoleon 46.
History Charts: In colors; get wonderful results in fixing in the mind, by a device similar to the Map Method in Geography, the Great Facts of History.
Biographies: (Including Living Celebrities)..... 3,000
Geography: Africa 17, Alps 12, America 26, Canals 25, Coal 8, Nile River 11, Volcanoes 11, Austria-Hungary 21, China 20, England 47, France 69, German Empire 29, Holland 21, India 29, Ireland 8, Norway 11, Prussia 23, Russia 17, Scandinavia 16, Scotland 19.
Maps: Of all countries, in colors, besides numerous text maps.
Science: Astronomy 18, Planets 9, Chemistry 10, Acids 10, Light 14, Physics 11. (Treatment of Botany and all other branches of Science equally full.)
Music: Articles on Musical subjects, over..... 70
(Including Acoustics, Harmony, Notation, Opera, Religious Music, Teaching of Music, Biographies of Eminent Singers and Composers, including Paderewski, Damrosch, and other Living Celebrities; and 50 articles on the most important Musical Instruments.)
Art Subjects: Architecture 10, Art 80, Art Galleries 12, Artists 80, Cathedrals 59, Pottery 14.
Literature and the Drama: Drama 10; The Literature of all Nations 22; besides special articles on Literature for Children, Synopses of Famous Literary Works, Famous Characters in Literature, Authors and their Works, including Living Celebrities.
Mythology: (Articles on Gods and Heroes) 85
Book Lists: (Lists of Best Books on Every Subject).....Titles: 16,000

Women's Clubs: Material for Programs and Social Service Work. (See special announcement elsewhere.)
Ministers and Bible Students: Articles on Characters, Places and Peoples referred to in Bible and Religious History..... 249
Business and Professional Topics: Include Banking, Investment, Engineering, Stenography, Law, Art, Mechanics, Civil Service, Electricity (18 articles), Bookkeeping, Manufacturing Processes and Materials, Chemistry, etc.
Keeping Well: Deals with Injurious Habits; Care of the Eyes; Heating and Ventilation; Sterilizing Milk; Causes of Contagious Diseases, etc.
Boy Scouts: (Special Department.)
To Help You Select a College: (Articles on all leading Universities.)
Things it is Embarrassing Not to Know: Correct Pronunciation; "How and Why of Etiquette and Good Manners." (Special Department. See announcement elsewhere.)
How and Why Library: Covers all subjects little children study in school. Author's style has been compared to Kipling's. .....Pages: 470
Full page illustrations in this Volume Alone (many in colors)..... 117

Form: 8 Vols. 7x10 inches. Strongly bound, marbled edges (so that it can be handled by children without soiling). Beautifully stamped in full gold.

Type: Sharp and clear 8-point, Old Style.
Total Pages 3,500

MISCELLANEOUS SUBJECTS—ON MANY OF THEM INFORMATION IS NOT EASILY FOUND ELSEWHERE

A REFERENCE WORK THAT IS UP-TO-DATE

ARTICLES ON LAWS AND POLITICS

THE STUDENT'S is thoroughly up-to-date. As examples see articles on: The two latest Constitutional Amendments, (relating to Income Tax, and the Popular Election of Senators); Parcels Post, Postal Savings Bank, Progressive Party, Woman's Suffrage, The New Department of Labor, Initiative, Referendum and Recall.

ARTICLES ON GREAT EVENTS OF CONTEMPORARY HISTORY

The Revolution in Mexico
The Titanic Disaster (with consequent Changes in Shipbuilding)
The Forming of the Chinese Republic
The Balkans and the Peace of Europe
The Turco-Italian War

ARTICLES RELATING TO QUESTIONS OF THE DAY

Income Tax	**Child Labor Laws**	**Corporations**	**Factory Legislation**
Immigration	**Inheritance Tax**	**Juvenile Courts**	**Sweat Shops**
Tariff	**Taxes**	**Trusts**	**Socialism**
Anarchism	**Civil Service**	**Etc.**	**Etc.**

SOME CELEBRITIES WHOSE BIOGRAPHIES ARE GIVEN

Premier Borden of Canada; President Wilson and His Cabinet; Vice-President Marshall, Walter H. Page, the new Minister to England; Lyman Abott, George Ade, Balfour, Colonel Cody, Duke of the Abruzzi, President Eliot of Harvard, Cardinal Gibbons, Dr. Hadley, President of Yale; Judge Lindsey, La Follette, H. W. Mabie, Marconi, Edwin Markham, Jacob Riis, Roosevelt, Taft, Henry Van Dyke.

PROMINENT MEN AND WOMEN WHO HAVE DIED RECENTLY

Sketches of prominent men and women who have died recently and who are constantly being referred to include:

Captain Scott, the Explorer
Clara Barton, Founder of American Red Cross Society
Alfred Austin, Poet Laureate
Wilbur Wright, who Made Flying Practicable

ARTICLES ON REMARKABLE MACHINES

Slot Machine, Calculating Machine, Cash Register, Type Setting Machines (the Linotype and Monotype), Wireless Telegraph, Moving Picture Machine, Hydroaeroplane and other Flying Machines.

ARTICLES OF A GENERAL NATURE

Such titles as the following illustrate the many other interesting and valuable subjects of a miscellaneous nature: Fish Culture; Esperanto, the Universal Language; Free Masons; Hanging Gardens of Bablyon; Stock Yards of the Great Cities; Meaning of our State Names.

ARTICLES RELATING TO EFFICIENT CITIZENSHIP

Peace Societies, Hague Peace Tribunal, Navy, Army, Government, Crime, Convict Settlements, U. S. Constitution, Law, Law in the U. S., Suffrage, Political Economy, Political Parties, Citizenship, Courts of Justice.

GOOD SCHOOL SUBJECTS OUTSIDE THE ORDINARY SCHOOL TOPICS

Origin of Festivals and Holidays, such as Easter, Hallowe'en, etc. (15 different articles); Artesian Wells; Earthquakes; Eclipse; Flags; Flags of Truce; Steel Engraving; Wood Carving.

NOTICE THE DIFFERENCE

COMPARE the treatment of common subjects, like the snail, as given in the ordinary encyclopedia, with the manner in which such subjects are treated in the "Student's."

BRITANNICA

Technical terms, 40.
(Latest edition, 11th.)

SNAIL. In England the word "snail" in popular language is associated with **Gasteropods** which inhabit land or fresh water, and which possess large conspicuous spiral shells; **terrestrial Gasteropods**, in which the shell is **rudimentary** and concealed, are distinguished as "slugs." In Scotland the word "slug" is absent from the **vernacular** vocabulary, both shell-bearing and shell-less inland **molluscs** being known as snails. Marine **Gasteropods** are occasionally termed "sea-snails," and the compounds "pond-snails," "river-snails," "water-snails," are in common use. The commonest land-snails are those species which constitute the family **Helicidae**, order **Pulmonata**, sub-order **Stylommatophora**. The families **Limacidae**, **Arionidae** and **Oncidiidae**, of the same sub-order, include nearly all the slugs. The **Oncidiidae** are entitled to the name "sea-slugs," as they are shell-less **Pulmonates** living on the seashore, though not actually in the sea. The term "water-snails" includes the whole of the remaining sub-order of the **Pulmonata**, namely, the **Basommatophora**, in which the eyes are **sessile**, with the exception of the **Auriculidae**. The latter are terrestrial and occur mostly near the seashore. Thus the whole of the **Pulmonata** (which breathe air) are destitute of gill-plumes and **operculum** and have a complicated **hermaphrodite** reproductive system, are either snails or slugs. But there are a considerable number of snails, both **terrestrial** and **aquatic**, which are not **Pulmonates**. The land-snails which have no gill-plumes in the mantle-chamber and breathe air, but have the sexes separated and possess an **operculum**, belong to the orders **Aspidobranchia** and **Pectinibranchia** and constitute the families **Helicinidae**, **Proserpinidae**, **Hydrocenidae**, **Cyclophoridae**, **Cyclostomatidae** and **Aciculidae**. The fresh-water snails which are not **Pulmonates** are the **Paludinidae**, **Valvatidae** and **Ampullaridae**, together with the **Neritina**, a genus of the **Neritidae**. These all possess a fully developed gill-plume and are typical **Pectinibranchs** of the sub-order **Taenioglossa**, most of the members of which are marine.

JOHNSON'S

Words in definition, 156. Technical, foreign and difficult words, 23.

(From Johnson's Universal Cyclopedia)

SNAIL. (O. Eng. Snoegel: icel. snigill: dial. Germ. schnegel; cf. Germ. schnecke, snail; Tuton, snag-, crawl): terrestrial, gasterpod, mollusca, categories, Pulmonata, Inoperculate, operculigerous, Cyclostomidae, Aciculidae, Littorinidae, Helicinidae, Proserpinidae, Diotocardia, dentition, lingual.

AMERICANA

Following are the technical terms in article on snails in the Americana—48 in all.

Gasterpodus	**Limax maximus**
Helicidae	**L. campestris**
Limacidae	**Arion fuscus**
Pulmonata	**Philomycus carolinensis**
Amphibolidae	**Epiphragm**
Operculum	**Helix alboiabris**
Odontophore	**H. alternata**
Basommatophora	**Zonites milium**
Stylommataphora	**Helix pomatia**
Melampus lineatus	**H. aspersa**
Auriculidae	**Paludinidae**
Limnaeidae	**Gasteropoda**
Planorbis	**Prosobranchiata**
Limnaea	**Ctenidium**
L. stagnalis	**Valvatae**
Physa hetrostropha	**Ampullariae**
Sinistral	**Paludina**
Ancylus	**Vivipara**
Glandina truncata	**P. intergra**
Testacellidae	**P. intertexta**
Testacella	**P. vivipara**
Arion	**Pleuroceridae**
Agriolimax	**Mélaniidae**
Limax	**Io spinosa**

Now compare the following article on the snail in THE STUDENTS; only 4 technical terms, two of which are defined in the article itself:

SNAIL. A shelled mollusk belonging to the class Gasteropoda. The land-snails are widely distributed and well-known. They are air-breathers, and, feeding upon vegetation, do much injury in gardens. The animal is spirally coiled to fit into its shell. The lower part of the body, called the foot, can be protruded. There are four tentacles or feelers on the head, which can be shortened or extended at will. The longest pair have eyes in their tips. There are slender muscles attached to the apex of the shell and to the animal's foot, by means of which the animal is drawn into its shell. In dry weather or in winter the opening is often closed by a horny structure, called the operculum. There are an immense number of land-snails in tropical countries, of considerable size and bright colors. Some are tree-climbers and secrete a thread of mucous substance, by means of which the body is suspended like that of a spider by its thread. They are eaten as food, especially in Europe. There also are water-snails, some of which come to the surface to breathe air, while others are provided with gills. The common garden-snail has 135 rows of 105 teeth each, making 14,175 in all.

A GREAT EDUCATIONAL IDEA

WHAT IT HAS ACCOMPLISHED FOR THE TEACHER AND THE CHILDREN

One School Journal's Opinion

THE NEW STUDENT'S REFERENCE WORK. Published in eight volumes with an additional volume every third year. 3000 pages. Cash prices, $41.75 a set in red buckram, $56.00 in Booklover's binding. S. L. Weedon Company, Cleveland, Publishers.

This reference set is valuable for the school and home library alike. All subjects in the curriculum are herein outlined for elementary and high school work and the page references are given with each outline. Outlines cover such subjects as geography, nature study, history, agriculture, literature, and physics. The language has been chosen with a view to the child's vocabulary and possesses few unusual and difficult technical terms. Illustrations throughout are good and make a striking visual appeal.

Pennsylvania School Journal, 1926.

Practical Comments by

A U. S. Commissioner of Education
Doctors of Pedagogy
Presidents of the N. E. A.
Institute Instructors
City and County Superintendents
School Principals
School Teachers
The President of the Audubon Societies
Edwin Markham, and other Prominent People

PUBLISHED BY THE S. L. WEEDON COMPANY
2036 EAST 89TH STREET
CLEVELAND, OHIO

Books and the Duties of Publishers

NO responsibilities are greater than those which everyone necessarily assumes toward books—either by using or abusing or neglecting them.

We might add to our marginal quotations about books, many to the effect, that bad books are harmful—very harmful; that good books are profitable—in every sense; and that delay in learning to appreciate the right kind of books is dangerous; for, if not acquired in childhood and youth, it is seldom acquired at all.

To this we wish here to add this quotation from Parker:

"Books that help you most are those that make you think" what may be called "student" books.

As publishers we have accordingly felt strongly our own obligations with regard to the unique undertaking described in this pamphlet.

As originators of this work we recognized that we might not be the best judges of its merits. The question of the merit of a book is like a case in court—it is always best determined by the testimony of expert and disinterested witnesses.

We, accordingly, after having exercised every care in planning the work and having called to our aid in carrying out this plan the eminent educators whose names appear in the list of editors and contributors, submitted the finished product to other educators who had no part in its preparation, and followed this by a thorough test in the school and in the home—in the hands of teachers, parents and pupils. The results of this examination and experience are shown in the reports which follow.

Official Reports by High Authorities

The following reports on the educational merits of THE STUDENT'S are from representative men who, in their official positions, are responsible for the conduct of our schools. They are, of, course, interested in securing the greatest efficiency on the part of both teachers and pupils, and are—for that very reason—particularly careful in their examination of educational works and correspondingly cautious in endorsing them. Notice the expressions to this effect in several of these reports.

The list includes an Ex-United States Commissioner of Education; two of the Presidents of the National Educational Association—the largest organized body of teachers in the world; State Superintendents, Superintendents of City Schools.

EXTRACTS FROM SIGNED REPORTS

"A guide for systematic study."
"Altogether the best of its kind."
"The Nature Work is very attractive."
"Essential part of a teacher's outfit."
"The practical Index and Cross References make the work invaluable."
"Will delight boys and girls who want to know —and that is all of them."
"Eliminates much that is irrelevant to a teacher's work, and thus saves time."
"Lesson Outlines of great assistance and show result of long and exacting study."
"Every pupil who has access to it will have decided advantage over those who have not."
"If a set were in every home, it would be possible for teachers to do a vast amount of reference work which, without it, is now out of the question.
"Have not been able to find a subject treated in larger books that is not found in this one, and I have found some that were not found in larger ones."

FROM THE HEAD OF OUR EDUCATIONAL SYSTEM

The Merits of the Students Tersely Stated

I have examined THE NEW STUDENT'S REFERENCE WORK. I wish to say I am greatly pleased with it. It has the great advantage of not being overfull. The lesson outlines will prove very helpful to a large number of boys and girls, who will use them as a guide for a systematic study of the subjects outlined. The whole set should be very helpful.—*P. P. Claxton, Ex-United States Commissioner of Education.*

FROM PRESIDENTS OF THE WORLD'S LARGEST EDUCATIONAL ORGANIZATION

The national Educational Association is the largest body of organized teachers in the world. The president of the association is elected annually. The two educators whose names appear below and who have consented to pass upon THE STUDENT'S, filled the office with distinction.

Has Applied the Test of Use

Have applied the test of use in my own home and found it most helpful. Particularly adapted to the use of students and young people.—*E. T. Fairchild.*

Feels Justified in Making an Exception

It is almost my invariable custom to decline to give testimonials or recommendations to any book or series of books; but after an examination of THE NEW STUDENT'S REFERENCE WORK I feel justified in varying my usual rule and in commending this work to those desiring a scholarly, concise, admirably arranged ready reference library of valuable and reliable information upon a variety of subjects.—*J. Y. Joyner.*

FROM STATE SUPERINTENDENTS

Essential to a Teacher's Equipment

With some care I have examined THE NEW STUDENT'S WORK. I consider it a most valuable equipment in teaching on account of its particular adaptability to school work. I commend it to all teachers as an essential part of a teacher's outfit, and to school boards for school libraries. It is also a valuable work in the home for family use and reference.—*Mason S. Stone, State Superintendent of Education for Vermont.*

More Than Maintains Its Leading Position

I knew the work in its first edition, when I regarded it as altogether the best thing of its kind, and I am pleased to note that in its recent form, it has more than maintained its leading position. The record of success which it has won and maintained during the years in which it has been before the public is, perhaps, the best indication of its worth.—*George B. Cook, State Superintendent of Arkansas.*

A GREAT EDUCATIONAL IDEA

From a Prominent Southern Superintendent

We have used THE NEW STUDENT'S REFERENCE WORK in several of our schools, and I have a copy for my family use. I have found it to be full of valuable information, adapted to family use, and especially valuable for student's libraries. —*Lawton B. Evans, State Superintendent of Schools, Augusta, Ga.*

School Committee Recommends It for Teachers and Pupils

The Committee appointed to examine the NEW STUDENT'S REFERENCE WORK considers it worthy of being placed in the various schools and school libraries. It is especially adapted for use for pupils from fifth grade through high school and is an excellent reference work for primary teachers. —*Committee for Dayton (Ohio) Public Schools.*

For Teacher and Student Alike

I have examined THE NEW STUDENT'S REFERENCE WORK and consider it an uncommonly useful reference library for teacher and student alike.—*H. C. Morrison, Superintendent of Public Instruction, New Hampshire.*

FROM CITY SUPERINTENDENTS

An Excellent Work

I have examined THE NEW STUDENT'S REFERENCE WORK and find it to be an excellent work.—*Hugh H. Lansing, B. A. Superintendent of Schools, Watervliet, N. Y.*

Broke His Rule for the Children's Sake

For some time I have declined to give testimonials as to the merits of different books which are offered for examination, but as THE NEW STUDENT'S REFERENCE WORK could be of so much use to the school children with their study and preparation of lessons, I have decided to give this note of endorsement.

The work is cheap, the information valuable and practical. It is the best of its class that I have examined and used.—*John J. Blair, Superintendent of Schools, Wilmington, N. C.*

Admirably Arranged and Indexed

THE NEW STUDENT'S REFERENCE WORK is so admirably arranged and indexed that information desired can be easily and quickly found. It is a convenient work for any home, but especially so in a home where young people are growing up. I do not hesitate to recommend it.—*D. C. Arnold, Superintendent Cleveland City Schools, Cleveland, Tenn.*

Gives the Child an Advantage

THE NEW STUDENT'S REFERENCE WORK is very valuable in the hands of children and is a fine acquisition to any library. In fact the child who comes from a home with books of this kind in the library has a distinct advantage over the child who lacks good library advantages.—*James W. Bradner, Superintendent Public Schools, Ashland, Ky.*

Should Be in Every Home

I must confess that THE NEW STUDENT'S REFERENCE WORK is one of the best sets of books I have yet seen. It should be in every home and every library.—*J. C. Benedict, Superintendent Public Schools, Saugerties, N. Y.*

A Style That Holds Attention

Have used THE STUDENT'S for six years. Take great pleasure in expressing my entire satisfaction with the work. The judicious selection of subjects has made it possible to present within a limited space more available information than is often found in works of reference that are more extensive. It is, in every respect, up-to-date, and the subjects are presented in a style so pleasing as to attract and hold the attention of the reader.

Among the contributors, who are all men of national reputation, are leaders who have become conspicuous in developing the educational system of the country. I do not hesitate to recommend this work.—*C. B. Chapman, Superintendent of Schools, Macon, Ga.*

Gives Ready Access to Information

To any parent or patron interested in reference work for children or themselves, the NEW STUDENT'S REFERENCE WORK is exceedingly well arranged and adapted. It would be an excellent thing for every child to have this set of reference works, so as to give him ready access to the knowledge he is so vitally interested in seeking.—*O. B. Drake, Superintendent, Canon City Public Schools, Canon City, Colorado.*

Material Authentic and Reliable

My acquaintance with THE NEW STUDENT'S REFERENCE WORK has shown me that the work is authentic, the material is well selected. The work is ably edited and reliable. The work is very serviceable and well adapted for the use of pupils from about the sixth grade on through High School.

Any person interested in a work of this kind can hardly secure greater value for his money than is to be found in THE NEW STUDENT'S REFERENCE WORK.—*H. L. White, Superintendent Independent School District of Ceredo, Kenova, W. Va.*

WHAT IT HAS ACCOMPLISHED

Will Encourage Others to Buy It

Am very well pleased with the NEW STUDENT'S REFERENCE WORK. Will encourage my teachers to take them.—*Mary Nadeau, Downer, Minn.*

Should Be in Both Home and School

I have known THE STUDENT'S REFERENCE WORK in school work for several years, and I cannot speak too highly of its value in the home library. THE NEW STUDENT'S REFERENCE WORK is newer and more up-to-date in all essentials. It is the kind of work each pupil should have at hand at home as well as at school. If you do not have such a work in your library, it will be to the interest of your children to take time to look it over. A careful examination will convince one of the utility of this work.—*G. W. Gehrand, Superintendent of Schools, Marquette, Michigan.*

Invaluable and a Delight for Children

The range of subjects is large, the treatment direct. I think it is a very desirable set of books to be in any home where there are children and an invaluable work for our elementary schools. THE HOW AND WHY LIBRARY is a gem. It will delight boys and girls who want to know—and that is all of them.—*H. C. Cox, District Superintendent of Schools, Chicago.*

From the President of the Largest Local Labor Organization in the World.

CHICAGO FEDERATION OF LABOR — UNITY — AFFILIATED WITH A.F. OF L. — ORGANIZED NOV. 9 1896

I feel, in justice to you, I should write you with regard to your publication. My wife happens to be an ex-school teacher, and since I took it home she has been so interested in it I have almost had to do my own cooking.

We both realize what it will mean to our boys in connection with their school studies, and she says that she would give almost anything for it if she were teaching again.

Brains never counted for so much in earning a living as they do today, and a boy starting out in life had better have a good education in his head than too much money in his pocket.

With great respect, I am

John Fitzpatrick

President Chicago Federation of Labor.

Official Adoptions

THE STUDENT'S has for a number of years been on the adopted list for reference works in the schools of Boston, and is now not only on the lists of Chicago and other cities, but on that of most of the states.

In the bulletin issued by the State Superintendent for the guidance of the schools of Kentucky in the selection of books, THE STUDENT'S is included in the list of "The World's One Thousand Best Books," and with this special note:

"THE NEW STUDENT'S REFERENCE WORK contains a complete list of such subjects as come within the range of every day reading and the studies and experiences of school life".

No special effort has been made to secure a place on these lists of selected books, and the distinction accorded has been solely due to the character of the work and the experience of the schools in its use for the past twenty years.

Mothers as Teachers

What Lincoln Owed to His Mother.

(*From an article on "How Can I Educate My Child at Home" in the Ladies Home Journal*)

The chief occupation of the mother should be the education of her child, and rare is the teacher whose qualifications make her teaching equal to that of the mother.

Lincoln's mother, uneducated, taught her boy so effectively in the wilderness as to fulfill the real purpose of a school, which is to make a school unnecessary.

Letters From Home

WHAT MOTHERS SAY ABOUT THE STUDENT'S AND THEIR CHILDREN

The following are truly "letters from home". We suggest that every mother reading them should ask herself this question:

"If *other* mothers have found these books so interesting and so valuable for their children—have taught the children how to help themselves in their school work—(for the best part of teaching is teaching the children to help themselves) why shouldn't *my* children have them too?"

Will Last for Years

Am surely proud of my books now that I can call them my own.

Think they are all you claim them to be and are so full of useful information. They are so nicely bound and will last for years with most any kind of treatment.—*Mrs. W. A. Barfield, Orlando, Fla.*

Needed in Every Home

I wish it were possible to place a set in every home where there are children. It is, I think, of inestimable value to any student or any one desiring accurate information. It possesses all of the good qualities of any of the better class encyclopedias without the drudgery of technicalities. I most heartily recommend this work. —*Mrs. Ella M. Oliver, President, South Knoxville Mothers' Association.*

Convinced of Their Value

I must admit I was quite skeptical at tne time I purchased THE NEW STUDENT'S REFERENCE WORK, but the more I study them with my little girl the more convinced I am that they will be a great help to us all as well as to the little girl.—*Mrs. Herman R. Eaton, Shrewsbury, Mass.*

Taking an Interest

The boy is taking an interest in the set and they will help him considerably.—*L. J. Simmons, Albany, N. Y.*

Perfectly Satisfied

I am perfectly satisfied with the books and consider them a valuable work.—*Mrs. C. B. Lane Rockland, Mass.*

For Children Up to Eighty

I find it to be one of the best books I ever saw for wide awake nature loving children between the ages of eight and eighty.—*George W. Johnson, Rural Carrier No. 4, Jackson, Ohio.*

Pleased with the Books

We are pleased with the books.—*Mrs. R. O. Edmunds, Columbia, S. C.*

"Very Fine"

Your books are very fine.—*Mrs. C. L. Hutman, Rathdrum, Idaho.*

Wants More Just Like Them

I get a great deal of pleasure as well as knowledge from your books and would not be without them. Kindly notify me from time to time as new volumes come out.—*Mrs. H. C. Jensen, Rathdrum, Idaho.*

Used Daily by All

I find my STUDENT'S of great practical value to me in my school, home and club work. I also have three sons (one in grammar school, one in high school and my eldest son, who is a civil engineer, having finished his course in our State University) who make almost daily use of the books. We would not be without them for many times their price if they could not be replaced.—*Mrs. J. A. H. Alsey, San Francisco, Cal.*

Glad Our Representative Called

I have found THE NEW STUDENT'S very helpful in many ways. The children are very much pleased. The books are something I have been wanting for a number of years, but just did not know where to get such valuable knowledge at a moderate price. I am very thankful that your representative called upon me.—*Mrs. H. L. Jones, Napa, Cal.*

Whole Family Completely Absorbed.

My family and I have spent the past two evenings completely absorbed in these books and their beautiful illustrations.—*G. S. Meloy, Chief, Bureau of Cotton Breeding Investigation, Department of Agriculture, Washington, D. C.*

We Think So Too

The NEW STUDENT'S REFERENCE WORK is very nice and I think every family with children should have a set.—*Mrs. W. E. Lemon, Trinidad, Colo.*

"The Whole Family Enjoys Them"

We are very much pleased with our set of NEW STUDENT'S REFERENCE WORK. My little four-year-old daughter has enjoyed the stories that I have been reading to her. I think it the best set of books I have yet seen, and I feel we, as a family, are going to enjoy reading them.—*Mrs. William G. Lockwood, Middletown, Delaware.*

WHAT IT HAS ACCOMPLISHED

From a Famous Writer and Other Prominent People

Since modern school work represents every phase of culture—everything that it is profitable—and profitable in the best sense—to know, we might naturally expect to find that tributes have been paid to the merits of THE STUDENT'S by distinguished people outside the teaching profession. Note the following which we select for illustration:

From a Famous Writer

The NEW STUDENT'S REFERENCE WORK seems to me to be a useful thing for a bright child—well worth the money asked for it. These volumes will help children to educate themselves. I have many encyclopedias; still I think this new one fills a special field of its own. I expect my ten-year old boy to revel in it.

Westerleigh Park,
West New Brighton, N. Y.

Edwin Markham

A Big Business Man's Estimate of "The Student's"

The other day an officer of the Company, publishers of THE STUDENT'S, was talking with the head of a large business organization, and THE STUDENT'S was mentioned. The latter remarked: "That is a great work that you people are putting out. I use it right along and it gives me just what I want to know. I wouldn't have a large encyclopedia. My father had the *Britannica* and I was brought up with that, but I never bought one of my own and if I were offered the two works side by side at exactly the same price I would take THE STUDENT'S every time. I have had a set for a long while and I wouldn't do without it."

Asking questions is the young child's method of gaining needed information, but very often when little folks try to use their question spade to gain information from parents, they are told, "Run along and don't ask so many questions." One reason for this parental command lies in the sad fact that very often parents cannot answer the questions that children ask, and busy parents do not have time to wade through volumes, seeking for information. That which every father and mother needs is a handy set of reference books filled with facts that every one should know but not overburdened with Mother Goose and fiction. Such a set of books is THE NEW STUDENT'S REFERENCE WORK.

Young students in the grammar grades; high school girls and boys and college students do not have time to go to libraries every day for material needed in school work. They needs a handy set of books, well bound so as to stand rough usage, and well illustrated so as to arouse keen interest, while giving practical information. Such a set of books is THE NEW STUDENT'S REFERENCE WORK.

Teachers, preachers, public speakers, authors, business men, club women, and politicians all need an up-to-date encyclopedia, rich in reliable information of the world's history. Such an encyclopedia is THE NEW STUDENT'S REFERENCE WORK.

In fact every one in the family from grandparents down to Kindergarten Tommy needs such a set of books on the family shelf for ready reference and for entertainment.

Personally, I enjoy these true book friends and there is not a day passes without my seeking the aid of THE NEW STUDENT'S REFERENCE WORK.

Winifred Stoner,
New York City. International Natural Education Ass'n.

Mrs. Winifred Sackville Stoner is widely known as lecturer and child-training expert, and especially as founder of the Natural Education system, which is designed to teach the child as he plays, and make his work as entertaining as his play. This is the system which she has used so successfully in the education of her daughter, Winifred Sackville Stoner, Jr. "Mother" Stoner has always lectured extensively from the platform, and lately has been talking to parents and children over the radio, as well. The following are a few of the facts given about her in "Who's Who."

Director of the International Association of Natural Education; President of the U. S. Branch of the Natural Education Forum; Head "Mother Stoner, Inc.", Member Author's League of America.

A GREAT EDUCATIONAL IDEA

UNQUALIFIED APPROVAL OF THE CATHOLIC TRUTH SOCIETY

The following is from a formal report on the character of THE STUDENT'S by the International Catholic Truth Society, signed by the President, Dr. McGinnis. At the time this report was made the officers of the Society included the Rt. Rev. Chas. E. McDonnell, Louis H. Amy, Francis C. Heenan, Francis A. McCloskey, Hon. Justice J. J. Curran and Hon. Charles J. Bonaparte.

We are happy to be able to inform you that after examination of "THE NEW STUDENT'S REFERENCE WORK" by several scholarly members of the I. C. T. S., the work contains no features to which Catholic parents or pupils might take objections.

The average book on these lines is generally marred by misstatements and a decidedly unfavorable bias. A fair tone characterizes this work, and we are pleased to note in it references to standard Catholic writers seldom mentioned by non-Catholic editors, and from this standpoint it merits a more unqualified approval than we could give to any similar work in the English language to day.

Very truly yours,

Jno. F. McGinnis. Pres.

Fair and the Best

"It is gratifying to find a work of this kind prepared in such a way that it can be especially commended to Catholic parents. A fair attitude is maintained throughout. From the Catholic standpoint THE NEW STUDENT'S REFERENCE WORK is the best work of its kind published".—*The New World.*

(The above appeared in the New World during the life of the late Bishop Quigley under whose auspices it was published.)

Source of Interesting Information

"THE NEW STUDENT'S REFERENCE WORK will prove a valuable asset to the home library. To children attending the elementary and secondary schools, these books will be a source of interesting and useful information in their research work."—*Sister M. Rosaria, St. Bernard School, Bradford, Pa.*

Scholarly and Practical

"It gives me pleasure to recommend so scholarly and practical a work. It is safe to say that this work is the most valuable and up-to-date reference work for school pupils on the market today. It is wisdom's part to ascertain such books of reference as can give the pupil the most reliable and useful information in the shortest possible time. THE NEW STUDENT'S REFERENCE WORK serves admirably this two-fold purpose". —*Sisters of Mercy, Ft. Smith, Ark.*

Replete with Valuable Information

"I have found in it nothing that would be objectionable from the point of view of a Roman Catholic. The work is replete with valuable information, and would be a credit to any library". —*Felix Dilly, Catholic Pastor, La Junta, Colo.*

Happy to Recommend It

"I find the work very practical and particularly adapted to the use of our young people in the schools. I am happy to recommend it to our students and the public generally".—*Arthur Lane, Rector, Church of Our Lady of Perpetual Help, Albany, Ore.*

A Work of Great Value

"We are pleased to say it is a work of great value. It serves as a most helpful teacher to those desirous of gaining useful and practical knowledge."—*Sisters of St. Francis, Lancaster, N.Y*

Just What is Needed for School Work

"Every pupil has use for this reference work. It gives the pupil just what he needs, because it deals especially with subjects pertaining to school life.

The work is made up of short articles which are written in simple language and to the point.

The price is certainly reasonable compared to the large encyclopedias".—*Sister M. Alexandra, Ponca, Okla.*

"Should Be in Every Library"

I consider it an excellent book in every respect. It contains nothing detrimental to faith or morals and should be in every library.—*Sr. St. Francis, Sup. Sister, L. I., Parochial Schools, Brooklyn, N. Y.*

An Education for the Whole Family

"It should find a place in the home of every family, especially where the junior members are still learners. Indeed, the senior members of the family, whose early education was not as complete as it might have been, will find it very helpful as well as educational".—*Father Tubman, St. Thomas Aquinas Church, Reno, Nev.*

Just The Books For You

WHAT THE EXPERTS IN PEDAGOGY SAY

Articles in THE STUDENT'S by Recognized Authorities—A Pleasure to Recommend It—Most Satisfactory Source of Information for Teacher and Pupil Alike—Well Arranged and Usable—Needed Every Day—Simple in Statement—The Best to be Had—Will Pay for Itself Many Times in the Daily Work of the School—Is-Up-to-date—Can Get What You Want Quickly.

System of Outlines—Simple and Valuable

I find that the expectations aroused by the names of its distinguished editors and contributors are fully met. The system of outlines and charts in all fields of knowledge should be especially valuable to teachers and the self-taught, while the attractive style, the abundance of illustrations, the lists of references answering questions of general interest, and the completeness of the work should make these books of great profit and delight to all.

Without hesitation I commend this reference work to schools and homes as one of the best I have seen.—*Joseph P. Kalbfus. The Kalbfus School, Rochester, New York.*

An Effective Aid to Children

THE NEW STUDENT'S REFERENCE WORK is a very considerable addition to our resources and has already proven an effective aid to the children. Its recept we consider one of the high spots in this school year.—*The Park School of Cleveland, Ohio. Ralph E. Boothby, Director.*

Highly Useful to Teacher, Children and Family

My examination of THE NEW STUDENT'S REFERENCE WORK, convinces me that it is a valuable work, full of practical information. Its presentation is clear, style readable, and in short highly useful and serviceable to teacher, children and family.—*Rev. Jos. J. Wehrle, Supt. of Catholic Schools, Diocese of Erie (Pa.)*

Dr. Kirkpatrick and His Children

Have found it satisfactory; can often get just what I want more quickly than from a cyclopedia, and my children use it with much greater success.—*Dr. Kirkpatrick, Head Department of Psychology and Child Study, State Normal School, Fitchburg, Mass.*

Fills a Very Useful Place

It will find a very useful place. Shall have pleasure in recommending it whenever opportunity offers.—*Edward C. Elliott, Professor in Education, University of Wisconsin, Madison, Wis.*

From Supervisor of Normal Model School

Most satisfactory source of information for teacher and pupil alike; hence I am glad to contribute a word of commendation in its behalf.—*Jennie Ackerman, Supervisor Model School, Pennsylvania State Normal, Indiana, Pa.*

For Daily Use

Subject matter so admirably stated that the young teacher or the upper grade student will find it so attractive and generally helpful as to appeal strongly to him in all his daily studies.—*Charles H. Albert, State Normal School, Bloomsburg, Pa.*

Especially Desirable for Home Study

I consider it one of the best works of its kind, a valuable addition to any library. It is especially desirable for homes having children needing to do home study and reference work in connection with their school duties.—*A. H. Covell, Principal, Oneida High School, Oneida, N. Y.*

Arrangement, Selection, Clearness, Illustrations

Very valuable because of careful selection of material; clearness of statement; helpful arrangement, and beauty and excellence of illustrations. An examination of the outlines shows the completeness of the work; all school subjects and methods of teaching them being covered by well-known authorities.—*E. L. Kemp, Principal, State Normal School, East Stroudsburg, Pa.*

Gives Cultural Background for Education

It is an excellent reference book for classroom and home use, and gives the child a cultural background for his education.—*J. Walter Gapp, Lansdale Public Schools, Lansdale, Pennsylvania.*

Indispensable Both for Teacher and Children

I know personally some of the educators who have helped in the making of it. Full of information for both teacher and student, and in such form that children can fully appreciate it. No teacher can afford to be without it. It is the very best to be had.—*Harriet Lyon, Institute Instructor and Supervisor of Model Department, Marshall College, Huntington, W. Va.*

Has Extensive Library, but Uses Student's Most

Have now had THE STUDENT'S for a half year, and notwithstanding the fact that I have a somewhat extensive pedagogical library, I have given your set most frequent use.—*Frederick C. Ayer, Professor of Theory and Practice of Education, University of Oregon.*

Examined Several Hundred Articles

After a critical reading of several hundred articles I am thoroughly convinced that the material is well adapted to the classes for whom it is intended—teachers, students and families.—*Weston Vernon, Ph. D., Head of Department of English, Logan, Utah.*

What The Teachers Say About Its Value in The School

Actual use in the school room by teachers of all grades and all grades of ability as well, has confirmed everything that the experts in education previously quoted have said as to the value of THE STUDENT'S as a working equipment for both teacher and pupil.

These opinions and these experiences, taken at random from thousands we have on file, make it absolutely conclusive that the teacher who does not get for herself a set of THE STUDENT'S is doing her future as a teacher a great wrong.

A Delightful Surprise

Each day I use them I find some very fine new points. I appreciate the set more than I can express.—*Louise B. Thompson, 302 West Iron Avenue, Albuquerque, N. M.*

Wonderfully Pleased

I am wonderfully pleased with the books.—*Myrl Sholts, Oregon, Wis.*

Finds Everything There

It contains ample reference for anything I want. —*Leonard Hill, Edgley, N. D.*

Used Nearly Every Day

I have found the books very satisfactory and have used my volumes nearly every day since I got them.—*Beth Holgate, Judd, N.D.*

Praises Them to All

I find the books a great help in my school work. I praise them to all.—*Mark Robertson, Gunter, Texas.*

Has Used Them Every Day

I have used them every day since I got them. —*Gladys Terry, Blanchard, Wis.*

A Work That Soon Pays for Itself

I have already been benefited a large per cent of cost.—*Dora Agnes Unger, Palestine, Texas.*

Aid to Teacher

I am highly satisfied with THE NEW STUDENT'S REFERENCE WORK. I find them a constant aid in my work as a school-teacher and I never cease to recommend them to people about me as sure guides to success.—*Miss Elena Russo, Nutley, N. J*

Home Benefited

Therefore I believe that a home with young people will be benefited by the addition of the NEW STUDENT'S REFERENCE WORK.—*Harry E. Pebly, Principal High School, Sharpsville, Pa.*

A Whole Library for Country Schools

I only wish I had secured it earlier, as in the country, teachers have so limited a library and no reference works to speak of.—*Lillie Combs, Frederick, S. D.*

Never Saw Anything So Helpful

I have never in all my experience as teacher come across any books that have helped me as much as these.—*Adeline Schreiner, Litchfield, Minn.*

"For Both Children and Adults"

It makes me very happy to know much concerning "THE NEW STUDENT'S REFERENCE WORK." I am able to say from the standpoint of a teacher and mother, that in comparison with other books of its kind, this set can be recommended the very highest to both children and adults for its splendid readableness; its method of presentation regarding outlines and stories; its feasibleness to all subjects connected with courses of study in our Public Schools and applicability to such use. From the teacher's viewpoint, this Work is extraordinary in meeting the needs of our present day method of Study, enabling pupils to meet and solve their needs for any subject concerning a topic, the socialized recitation or the solving of a problem.

It gives me great pleasure to give this message to all who are vitally interested in the best education for their children.—*Gladys Clay Page, Teacher, Franklin School, Stratford, Conn.*

For Every Grade

I am teaching a rural school and find I can use the work in every grade.—*Myrtle Granston, Viroqua, Wis.*

WHAT IT HAS ACCOMPLISHED

A Superior Publication

I have already ordered one set of these books for the town of Suffield and expect to equip the schools of Plainville.

In my judgment this is a superior publication for all pupils taking required history courses in high school.

It gives me great pleasure to recommend this book without qualification.—*Leon C. Staples, Superintendent of Schools, Connecticut State Board of Education, Plainville, Connecticut.*

Not only a Reference But a Guide

I regard of special value the elimination of all dead matter, the high standard of the contributors, the compact method of grouping valuable information, and the comprehensive guide which makes it more than a reference book.—*Philip Soulen, A. M. Principal Preparatory School, University of Idaho, Moscow, Idaho.*

A Liberal Education in Themselves

I find the books most satisfactory in every way for quick and effective work in the school room. I wish there might be a set in the homes of every one of our pupils also. They are a liberal education.—*Harriette T. Treadwell, Principal, West Pullman School, Chicago, and Ex-President Chicago Teacher's Federation.*

Source of Delight and Learning in Every Home

Professor McMurry, the scholarly editor, has for years been a leading educator and his associates are all experts in their fields. It would be a source of delight and learning in any household. *Frances C. Hickox, M.A. & Principal, North Junior High School, Niagara Falls, New York.*

A Striking Summary of The Student's Merits

THE STUDENT'S is a happy medium between the concise dictionary and the cumbersome encyclopedia. It is convenient in size and price. Some of its commendable features are: The simple, pleasing style of the language; its hundreds of good cuts; the convenient index with the cross references; its many large, beautifully colored plates on natural history; the careful markings for the pronunciation of proper names; the interesting account of subjects in mythology; the ingenious and useful colored charts and tables in history; and the accompanying Lesson Outlines. *E. D. Phillips, Principal, Manual Training High School, Kansas City, Mo.*

Principal Purchases for School and Home

My regard for the NEW STUDENT'S REFERENCE WORK is well expressed in the fact that I am ordering a set to be placed in the Durham High School Library and a set to be added to my home library for the use of my children in their school work. I may add further that this is the only written recommendation I have given for any book or set of books since my connection with the Durham schools.—*C. E. Phillips, Principal, Durham High School, Durham, N. C.*

A Treasure

"I fully realize what a treasure such a work is and what a help in the course of school work".—*Mother M. Stanislaus, St. Mary's Academy, Lockhart, Tex.*

Purchased for Parochial Schools

"THE NEW STUDENT'S REFERENCE WORK has been purchased by me for our Parochial Schools. I consider it a good work".—*John J. Higgins, Pastor, Church of the Immaculate Conception, Mattoon, Ill.*

Best Proof of Appreciation

"It commends itself to me as a work very valuable both to teachers and students, as it contains much needed information quite at hand. I intend to supply my teachers with the work, the best proof of my appreciation".—*Father John W. Crowe, President, Routt College, Jacksonville, Ill.*

A Remarkable School Help

First of all I would recommend THE STUDENT'S for school use because of the good language used and yet it is simple enough for the average child. The material is well organized and so indexed that it is easily obtained and enough information is given to meet the required needs of the child.

The outlines should be of help to the high school student in the daily preparation and for work on note books and short oral review of topics especially assigned him.

Summing up I would urge that every home should be supplied with a good reference library as the child needs it for encouragement and the use of such books can be wonderfully encouraged by the parent in cooperating with the teacher.—*Celia Morrison, Eau Claire, Wis.*

American Standard Raised

I have received THE NEW STUDENT'S REFERENCE WORK and am very much pleased with it. If each home could use such a set of books, America would no longer be considered a nation of "sixth graders."—*Thelma Nielson, Burlington, Colo.*

Pleased Her Superintendent

I more than enjoy the books and would not be without them for anything in the world. My children in school enjoy them as well as my friends. Our superintendent visited us and liked the books very much.—*Bess E. Livingston, Marathon, N. Y.*

A GREAT EDUCATIONAL IDEA

Easy to Own the Best

Price is so reasonable and terms so easy that any one can buy it without inconvenience. Will pay for itself manifold in the teacher's daily work.—*Scott Glenn, Conductor, Tecumseh Normal, Tecumseh, Okla.*

Concise, Accurate, Simple

I have myself had for several years a set of the older edition, of which this is an enlargement and improvement. Have found them very serviceable in rendering me quick, accurate and simply expressed information on matters which I had occasion to look up.—*Joseph E. Avent, Professor of Education, State Normal and Industrial School, East Radford, Virginia.*

Relation to Success in Teaching

It will make those who use it more resourceful, and therefore more successful in their work. The Outlines and Classified Questions are well arranged and usable.—*J. L. Jarman, President of the State Female Normal, Farmville, Va.*

A Masterpiece for Teachers

"The Story of Life," as told in the How and Why Library, opens to the inquiring minds of children a veritable fairyland of tangible fact whose exploration is so delightfully instructive and method of presentation so simple and full of charm, as to entitle this masterpiece of scientific narrative to a prominent place in every home and in the library of every school wherein the "story hour" is an institution of recognized need."—*Albert B. Guptill, Juvenile Commissioner, Third Judicial District, Fargo, North Dakota.*

Both Pleased

Enclosed please find the last remittance for the reference books which I purchased of you last winter. I am well pleased with them, as is my brother, who is now teaching.—*Olive Thayer, Baraboo, Wis.*

A Valuable Asset

The New Student's Reference Work is a valuable asset to any teacher. I am pleased with mine and would not take the sum I paid for it.—*Mrs. O. B. Rountree, Bridgeport, Texas.*

Articles Easily Understood

I have examined The New Student's Reference Work, and find it a splendid set for use in any American home. The work is especially appropriate for boys and girls in grade schools as well as those in high school. With these books boys and girls can do better work in school without wasting time in the library, and they will find these articles more easily understood than much of the reference material in our libraries.—*W. H. Kopf, Principal Lane School, Akron, Ohio.*

Cannot Say Too Much

The books are fine, indeed, and I cannot say too much in praise of them.—*Genevieve Bellis, Cohocton, N. Y.*

Value Almost Beyond Estimate

This set of books is almost without value; or to speak more correctly, is beyond an estimate in dollars and cents to any person of only a fair education. I am more than pleased to be able to own such a work.—*I. C. Williams, Pasadena, Cal.*

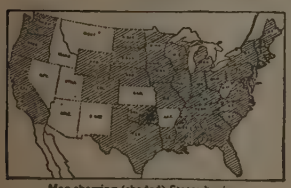
Great Help in Their School Work

"The Holy Name School is using the New Student's Reference Work. It is with pleasure that I endorse it for use in the home by pupils and parents. If all of our children would use it often, it would be a great help to them in their school work."—*Sister Mary Genevieve, Cleveland, Ohio.*

Satisfactory

The books are very satisfactory, and I find them a great help in my work.—*Annie B. Davison, Alden, N. Y.*

FROM THE PRESIDENT OF THE AUDUBON SOCIETIES



Map showing (shaded) States having Audubon Societies

Having looked over your New Student's Reference Work and your Lesson Outlines, I should say that both would be of very great value to the nature student. I am glad to endorse them heartily as works of reference for the nature student, either scientific or amateur.

President National Association of Audubon Societies.